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JANUARY/FEBRUARY 2009

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MERRYVALE/STARMONT
Energy efficiency and sustainability

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Cover photo: Shafer Vineyards (Napa, CA) grape sorting. Photo by Don Neel.

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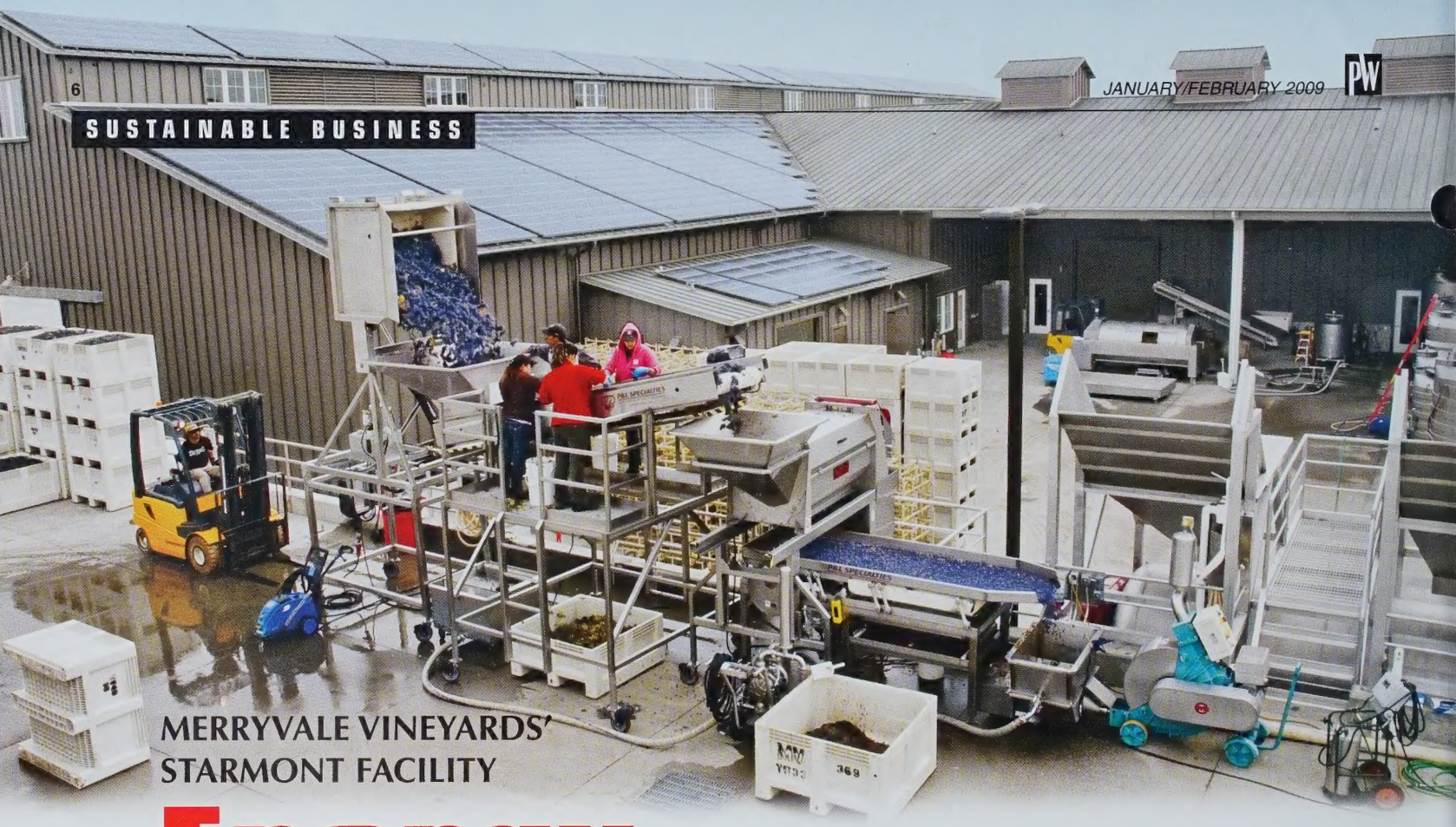

MERRYVALE VINEYARDS' STARMONT FACILITY

Energy efficiency and sustainability

The P&L Specialties automated, 10 tons/hour sorting system provides efficient M.O.G. (material other than grape) removal and gentle fruit handling, with minimal manpower requirement and minimal equipment. The system consists of an automated 1/2-ton bin dumper, an incline sorting table feeding a Puleo-15 destemmer, a LeTrieur™ 2+2 automated M.O.G. removal machine, and a CME 15 tons/hour (whole grapes) 4-inch peristaltic pump. All equipment is variable speed.

PWV staff report

A commitment to energy efficiency and sustainability began early on with the design process of the Merryvale Vineyards' Starmont facility and continues through its operation. The Starmont facility, located in the Carneros region just south of Napa, CA, is one example where the commitment to sustainability is apparent.

"Energy efficiency and sustainability occur at all levels of design," says Randy Simonson, project architect of BAR Architects (San Francisco, CA). "From locating the facility on the site, to specifying appropriate winery and mechanical systems, selecting paint and carpet; all these decisions are based upon what is most appropriate for this facility and site. It takes involvement from the entire project team to make the most sustainable project, and that is the approach we took for Starmont.

"Good design principles are inherently sustainable. One design challenge is to achieve the highest level of sustainability by marrying the client's level of commitment with the site context, building program, and overall project budget. With Merryvale Vineyards, the entire design team collaborated on every level to create a sustainable and energy-efficient facility."

Site planning for the Starmont facility addresses many design and sustainability concerns. By locating the facility on the vineyard edge, Merryvale preserved much of the agricultural land and existing vineyard, thereby reducing the amount of paved surface needed to access the production facility, with less impact upon the land.

"We took advantage of the natural grade on site by benching the building into the natural landscape," notes Simonson. "The grade change allowed for an elevated grape receiving area/crush pad and gravity flow from

STARMONT
MERRYVALE
2007
CHARDONNAY
NAPA VALLEY

the presses. Visually, this approach allows the building to nestle itself into the landscape — not an easy task for a 64,000 square-foot building."

Water and landscaping

Bioswales were integrated into the landscape and civil designs by Stephanie McAllister (Petaluma, CA), and Summit Engineering (Santa Rosa, CA). Bioswales are shallow vegetated channels that handle storm water runoff from the paved

PWV thanks the following experts for their input on this report: Randy Simonson, BAR Architects; Alan Soule, Soule Building Systems; Stephanie McAllister, Landscape Architect; Kimberly Burnett, SolarCraft; Bill Davidson, APCCO; Jim Conant, Logix Controls; Ed Barr, P&L Specialties; Sam McHenry, Accurate Forklift; Bill Hernandez, American Tartaric Products.

Drought-tolerant landscaping, insulated steel walls, and solar panels aid Starmont efficiency/ sustainability efforts.

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and landscape areas, and from the vineyard upslope above the winery, conveying it to collection points. By keeping the water on the soil surface longer (rather than having it go directly into a drain inlet), filtration through the soil matrix occurs, and infiltration into the underlying soils. Bioswales trap particulate pollutants, promote infiltration, and reduce the flow velocity of storm water runoff. As the vegetation matures, bioswales seamlessly blend into the "natural" landscaping.

The use of native drought-tolerant plants fit with the agrarian approach to the project. An underground sprinkler system was installed that is not a conventional irrigation system. The system utilizes recycled water from two small ponds retaining on-site-processed winery waste water. Processed waste water is used for landscape and vineyard irrigation, reducing overall water demand at the winery.

Steel walls and building elements

To achieve a traditional wood board-and-batten style appearance, Soule Building Systems supplied a more sustainable and low maintenance exterior cladding. Instead of wood, the Starmont facility exposes the insulated wall panels. The seams between the panels are covered with metal battens.

The wall panels are 2½-inch thick insulated steel panels with a urethane core (R20 insulation value). The exterior and interior metal skins are galvalum coated underneath the exterior paint finish. The galvalum coating (50% zinc and 50% aluminum) provides about twice the corrosion resistance of plain galvanizing (100%). The panels come from the factory with the final wall finishes, which are well suited to winery wash-down.

The standing seam metal roof has a pre-aged finish. The pre-aged finish

Interior steel wall panels are 2.5" thick (R20-insulation).

• Powdery Mildew?
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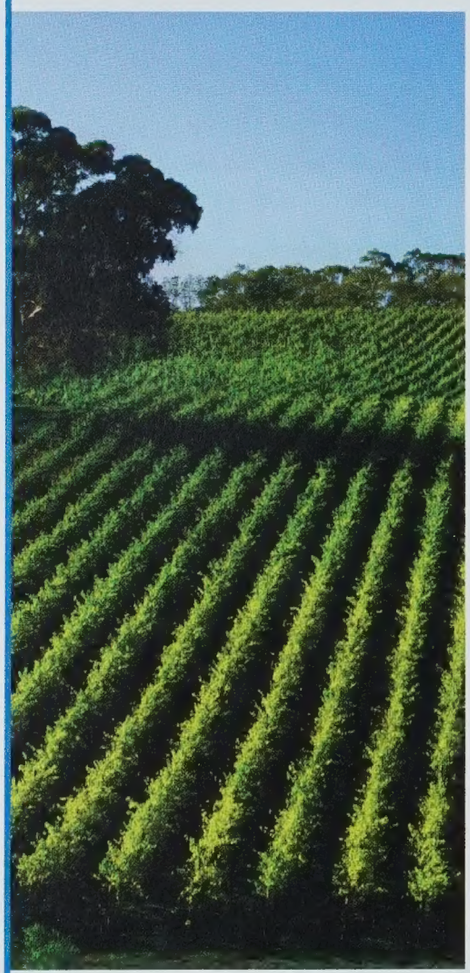

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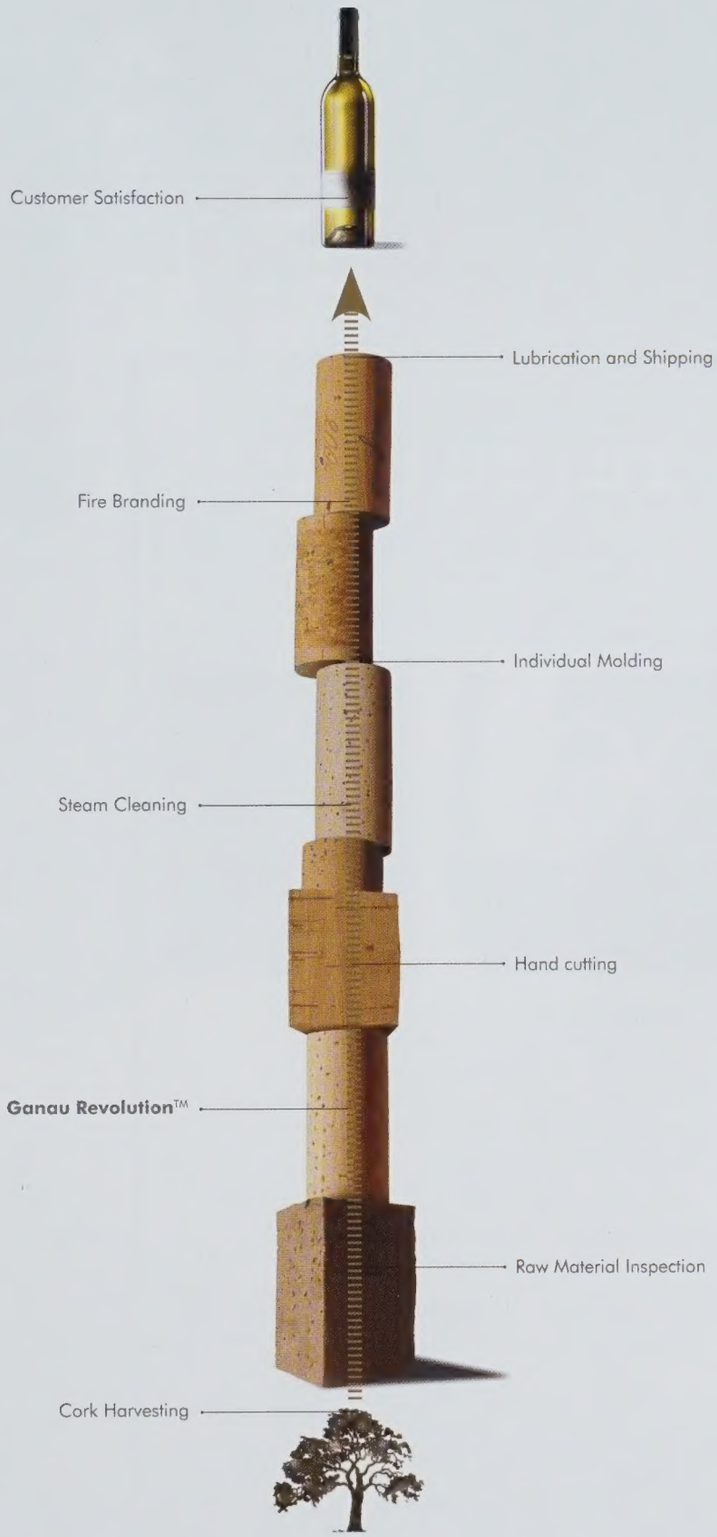

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allows the building to blend with the site while responding to zoning requirements for a low glare roof.

"The material of Starmont's metal walls and roofs is 80% (minimum) recycled steel," says Alan Soule (Soule Building Systems, Cotati, CA). "The standing seam metal roof has 4-inch thick urethane board insulation, with an R26 insulation value. The roof panels have a galvalum finish underneath a Supertique finish."

Light-gauge steel framing with a higher strength-to-weight ratio than wood framing was installed. The interior of the Starmont building has clearspans (large areas of open space for winery functions), with all support columns located on the exterior walls. Compared to lumber, the price of steel is relatively constant. Steel construction has a higher resistance to mold and lower maintenance cost, and the paint on metal panels has a 30-year warranty.

Electric forklift climbs incline to crush pad.

"With wood board and batten, the owner needs to budget for ongoing maintenance such as painting, staining, sealing," Simonson explains. "The exposed metal has a factory-applied Kynar finish. The panels require little to no maintenance for 20-plus years."

Other Soule winery projects include Bouchaine, Clos du Bois, Kendall-Jackson (Vinwood), Fetzer's Hopland bottling facility, Paul Hobbs Winery, Stonestreet, St. Francis Winery, and Paloma.

Natural lighting and ventilation

For maximum natural light, there are 30 windows in two clerestories and five dormers. The two long clerestories are positioned over the fermentation tank room, bottling, and barrel storage/ageing rooms. On the east elevation facing Highway 29, the dormers provide natural light to the barrel storage rooms, while breaking up the large mass of the winery.

The clerestories and cupolas also provide ventilation. The clerestories allow for CO_2 evacuation and night cooling. Over the barrel work area,

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Electric forklift charging station inside Starmont facility.

three cupolas provide CO_2 evacuation and night cooling.

There are 11 louvers in the clerestories plus two louvers at each of three cupolas to exhaust warm air. The upward air movement draws in cool nighttime air through 13 ground level louvers in the walls. For CO_2 evacuation, the high and low vent system operates in reverse. The system also provides smoke evacuation in the event of a fire.

Electrical system and solar panels

The use of photovoltaic solar panels was explored early on in the design of the winery. At that time, the integrated array was not penciling out for the owner. SolarCraft (Novato, CA) provided a specific performance and cost analysis for the winery. Through the Public Utility Commission's new construction programs, SolarCraft applied for rebates and tax incentives on behalf of the winery, and was granted the rebates in 2006.

The solar installation was less than 8% of the total cost of the Starmont building, with rebates reducing out-of-pocket cost by one-third.

Once the installation of photovoltaic panels became a viable option, BAR Architects worked with SolarCraft to integrate the panels into the winery design. The architects worked closely with SolarCraft in the layout of the

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panels, and profile of the roof attachment. SolarCraft chose a mounting system technology to satisfy the aesthetic needs of Merryvale. Extra time and effort in layout design and planning were committed to ensure that the completed installation would blend well with the overall design.

The 277 kW solar array contains 1,632 solar panels covering 22,205 square feet of south-facing rooftop space. From the most visible face of the winery, which is east toward Highway 29, the PV panels are unnoticed. Two Satcon 135 kW invertors convert the AC output from the panels to DC and send it to the utility grid.

SolarCraft mounted the panels with a Unirac SunFrame racking system and S-5 clamps. The non-penetrating S-5 clamp is designed specifically for attaching PV modules to standing-seam metal roofs. The SunFrame design is engineered to sit low to the roof without gaps between modules, and the modules are supported between the rails, rather than on top of them. The finished array is six inches above the roof, for cooling airflow to optimize module performance. All modules sit in low, gap-free rows without protrusions from the sides of the array.

The system was estimated to fulfill 60% of Starmont's energy needs, with payback in seven to ten years. The solar panels are under warranty for 25 years. Now that the winery has been operating for two years, the system is providing approximately 55% of the winery's energy needs (401,000 KW of the 750,000 KW used in 2008), and estimated payback of the system has been reduced to just five years.

Plumbing, Lighting, other building features

Localized instantaneous water heaters are used to reduce the amount of energy needed to keep a full-size tank of hot water when demand is low.

Motion-sensor lighting is installed in less frequently occupied spaces, such as restrooms and locker areas. The lighting in the administration area of the winery has locally manufactured light fixtures, whose purchase supports the local community, and reduces fuel consumption that would be needed to move products long distances.

Carpet tiles with a high recycled content were used in the offices and conference rooms of the winery administration area. If there is a localized stain that cannot be removed, replacing a carpet tile is much easier and more sustainable than replacing an entire room of rolled carpet. Merryvale keeps additional tiles on hand, and when a problem arises, carpet tile can be replaced. The carpet manufacturer has a return-recycle program, so that

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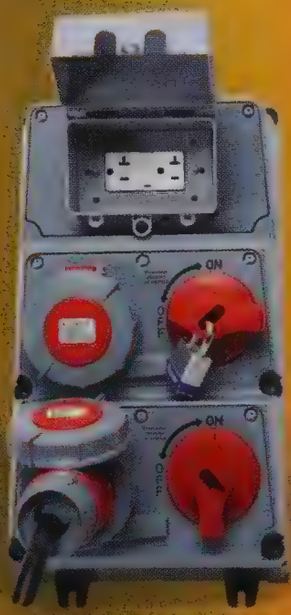

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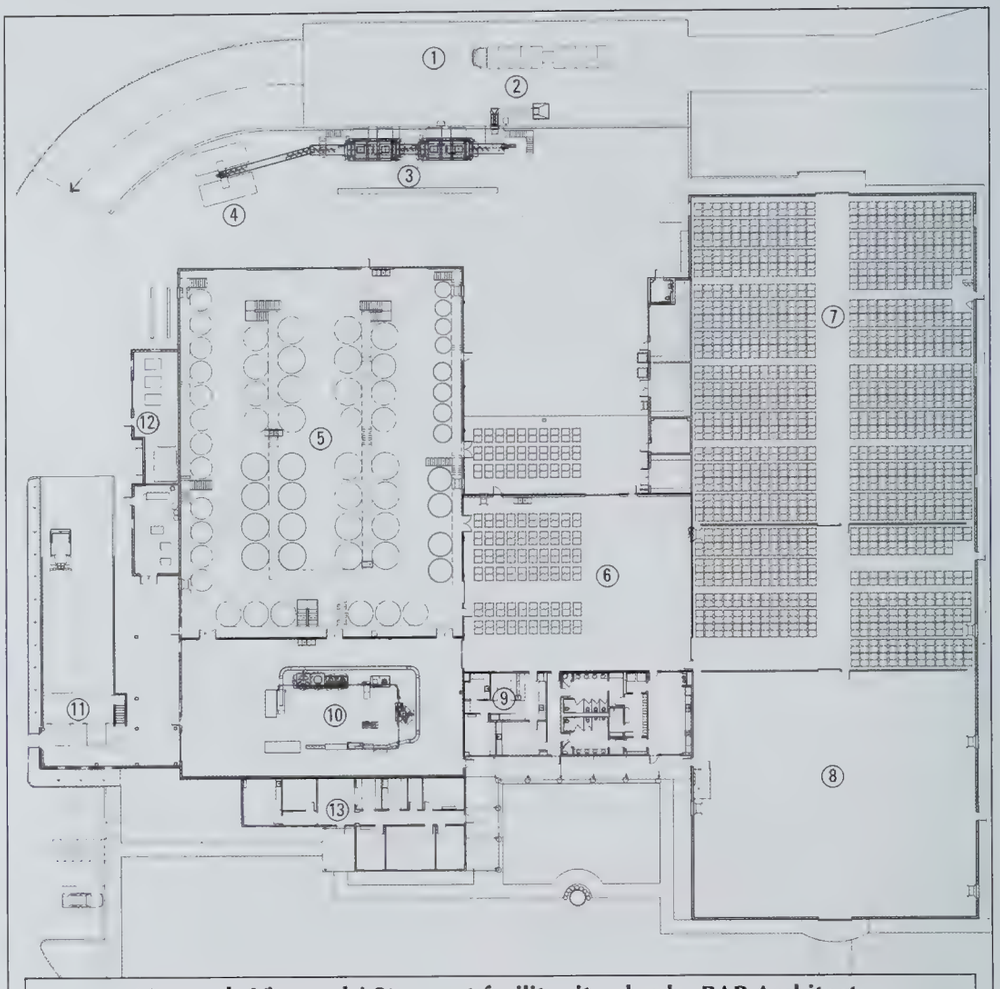


Merryvale Vineyards' Starmont facility site plan by BAR Architects

① Grape receiving
② Receiving hopper, sorting system, destemmer
③ Whole cluster loading of white grapes to two Bucher XP150 presses
④ Auger-fed pomace bin
⑤ Red fermentors, white juice tanks, bottling tanks
⑥ White wine barrel fermentation
⑦ Barrel maturation of red/white wine
⑧ Case goods storage
⑨ Lab
⑩ Bottling line
⑪ Loading dock to receive glass / ship bottled wine
⑫ Refrigeration equipment
⑬ Offices

used tiles do not end up in landfill. Old tiles can become new products.

In high-traffic areas such as the entry lobby, hallways, lab, and employee areas, the concrete slab is left exposed. Exposing the concrete flooring is sustainable because it reduces the amount of finish flooring by not introducing another flooring product, it is earily maintained, and it has a long life cycle cost.

Refrigeration efficiency

When Bill Davidson of Applied Process Cooling Corporation (APCCO) in Belmont, CA designed the refrigeration system for the Starmont facility in 2006, he contacted Scott Gillette of Logix Controls (Kirkland, WA), for a computer system to operate the environmental control equipment in the most energy-efficient manner possible.

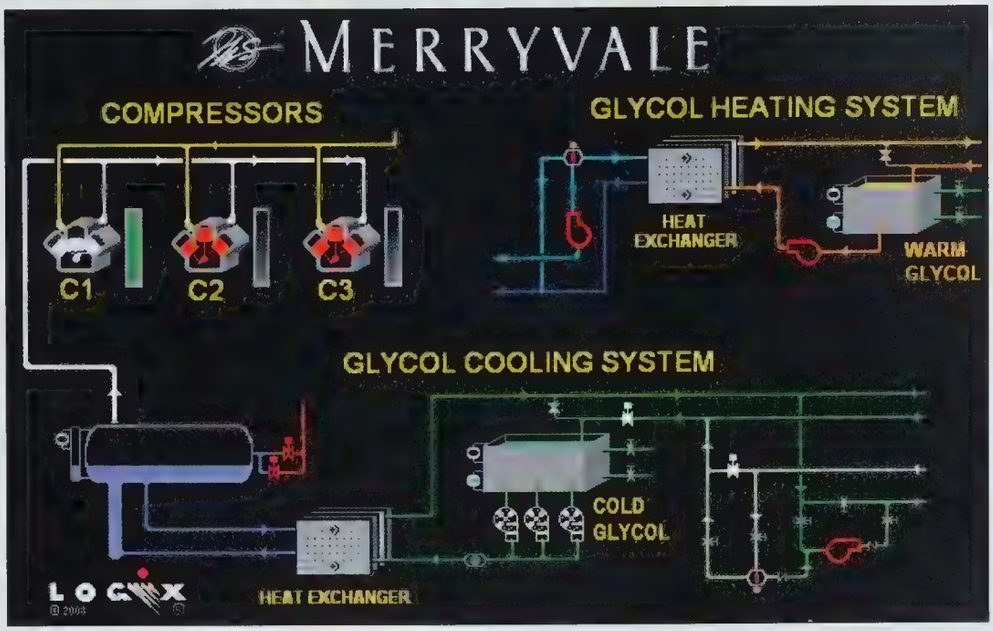
Davidson identifies the equipment needed to provide wine tank temperature control, room cooling or heating, barrel room humidity control, and CO_2 mitigation and night air control, including:

1. A glycol chiller with three (one 50hp and two 75hp) compressors to produce 177 tons of refrigeration to

provide the widest range of horsepower combinations to most closely match the annual range of winery cooling requirements for the lowest energy requirement.

2. A secondary glycol mixing loop that provides warmer glycol for the air handler units, to reduce compressor demand and prevent over-cooling of barrel rooms, and to reduce moisture removal in the rooms maintaining high relative humidity.

3. Variable frequency drives on glycol supply pumps that adjust speed as load varies, to minimize pump energy cost. All system motors are premium efficiency, providing maximum operating cost savings. A study by BASE Energy, Inc. (PG&E service provider), estimated an electrical savings of 30,988 kWh per year.



Gillette proposed a control system by Logix, a refrigeration controls manufacturer. The Logix system would select the most efficient combination of compressors for the current cooling demand while minimizing overall cooling demand with various glycol, air handling unit, and tank control strategies. On acceptance of the proposal by Starmont personnel, Gillette

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Starmont installed an Alfatek Victory Quadri-block counter-pressure filling system (maximum speed 7,500 bottles/hour), for its ability to preserve the character of the finished wine with virtually no oxygen pickup and no discernible bottle shock. The Quadri-block includes a bottle rinser that delivers water or steam through high-pressure injection nozzles; a 40-valve filler; 6-head corker; and 5-head screw capper.

and APCCO began consultations with Sean Foster, Starmont's senior winemaker/general manager.

The combination of APCCO's refrigeration design and Starmont's energy-efficiency focus led Logix to provide the following control features, according to Jim Conant:

1. Continuous evaluation of wine tank load and moderation of cooling demand, while preventing any risk to wine quality from improper temperature, resulting in minimized compressor energy demand for all load conditions.

2. Dynamic adjustment of refrigerant temperature in response to cooling demand, minimizing compressor energy for all load conditions.

3. Continuous optimization of compressor discharge pressure to minimize both compressor and condenser motor energy use.

Continued on page 109

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The harness/lanyard, connected to overhead guide-wires, is a full-compliance system for fall arrest from heights with a freefall of up to six feet, withstanding up to 5,000-lb weight-pressure. Note the monitoring Mission Hill employee in case rescue is necessary.

Harness procedures for fermentor room safety

BY Tina Vierra

Harvest, crush, and fermentation are busy periods in a winery, and full of activities dangerous to the health and safety of employees. Carbon dioxide (CO_2) exposure and falling are especially increased hazards during primary fermentation, with busy employees in the danger zone.

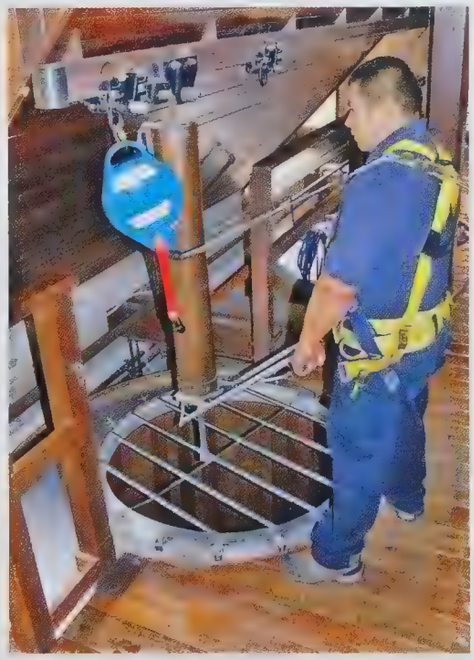
In fresh air, CO_2 levels are about 360 to 390 parts per million (ppm). OSHA (Occupational Safety and Health Administration) mandates that employees encounter no more than 5,000 ppm in an 8-hour workday, and NIOSH (National Institute of Occupational Health and Safety) states: "An employee's short-term exposure places their health in danger at levels above 30,000 ppm in less than 10 minutes."

CO_2 levels can approach 100% in a fermenting tank's headspace, and a closed tank's pressure-release valve will vent the gas into a fermentor room. Open-top fermentors cancel the need for the pressure-release valve, but constantly release CO_2 into the room. All this occurs when there is a winery employee on a catwalk above the tank, performing a punch down, pump-over, or sampling a fermenting wine. The employee is at a double risk at this moment — of elevated CO_2 exposure, plus the danger of falling from the catwalk.

In its ongoing efforts to showcase good practices, *PWV* located three wineries with innovative and thorough safety-harness programs in their fermentation rooms, to offer as positive role models for this aspect of winery operations.

Moon Mountain Winery (Sonoma, CA)

Moon Mountain Winery (owned by Diageo Chateau & Estate Wines) was founded in 1982, produces 10,000 cases of wine per year, with varieties including Cabernet Sauvignon and Cabernet Franc. The winery follows Diageo's international risk management practices, and winemaker Carol Wilson reports the safety practices and employee training are more stringent than OSHA's strict guidelines."We've had self-audits and monthly training in place, starting when Chalone Wine Group owned the winery, for longer



Rubicon Estate built H-and I-beam guardrails with kickplates, and planked the catwalks to avoid tripping danger. The harness-retrieval dual system is mounted to its own beam, engineered to withstand 5,000-lb weight-pressure, with fixed-length lanyard allowing limited freefall, and non-entry rescue if an employee falls.

than the six years I've worked here," Wilson says. "Since 2005, our training has been conducted by Jim Persons (Environmental, Health, and Safety Consultant). We have made updates and refined our training every year since."

The winery follows confined spaces safety practices (see "Maximizing Safety in Confined Spaces," *PWV*, March/April 2003) such as entry prohibitions and signage; two-person monitoring while emptying fermentors with a third person standing by in visual range for emergency calls; CO_2 monitors when working in confined spaces; and respirators when needed during cleaning, punch downs, pump-overs, additions, and general observations of wine in a tank.

The fermentation room is not large, containing 13 10-ton fermentors and two 5-ton tanks, all with removable lids. The punch down device was installed 20 years ago. The safety harness program, begun 10 years ago, consists of a harness, hooked to a self-retracting lifeline from the I-beam above the tank, and buckled to the employee performing punch down.

During harvest, all Moon Mountain employees are assigned a full-body harness (straps encompassing torso and legs), and must complete a safety inspection of it at the beginning of their shift, logging the result before starting work. Once on a catwalk, they are required to secure the lifeline from their body harness to the railing while working on the catwalk. All catwalks have barrier chains at entrances and are signposted to keep out visitors and unauthorized personnel.

Further safety guidelines in the winery's "Fall Protection Safety" handout include the use of work gloves, advice on pressure of tank lid gaskets, lid detachment, crane lifting of the tank lid, two-employee securing of the lid, and use of air brakes to secure the punch down device. Even the idiosyncrasies of the winery's

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equipment are addressed in the handout and annual training sessions.

Rubicon Estate (Rutherford, CA)

When Francis Ford Coppola bought the former Inglenook property in the late 1970s, he rebuilt much of the winery, which has had state-of-the-art safety programs, and personnel to update and maintain them, ever since.

Rubicon personnel are also working to upgrade equipment and educate winery workers at Coppola's new Rosso & Bianco Winery in Geyserville.

Rubicon produces Cabernet Sauvignon, Merlot, and Zinfandel, among other varieties, from 245 acres of estate vineyards. The red fermentor room has 12 open-top fermentors with a capacity of 1,600 to 2,000 gallons, with a 42-inch diameter manway for punch down and gravity loading.

Denise Breese (production manager) and Ricardo Patlan (cellarmaster) are two of the winery's safety managers. The winery follows a training program to protect workers from falls, designed by Mark Aniello of Environmental Compliance and Remediation (ECR, Walnut Creek, CA).

Aniello's training manual points out the fatality statistics and other dangers incurred by falls in the workplace, and offers both building requirements and employee procedures to mitigate these dangers. Hazardous locations in and around a winery include non-building elevated work locations such as catwalks and ladders, lift equipment, wall openings, floor openings and floor holes, and rooftops.

Rubicon followed Aniello's engineering guidelines when constructing the fermentation room, including installation of catwalks for work that could not be performed safely using ordinary ladders, using licensed engineers who built according to projected load standards on the catwalks, and planking the catwalks to eliminate tripping hazards posed by metal surfaces (see photo). Guardrails capable of supporting human weight in the event of trips or falls, and covers for all openings, completed the catwalk design.

"Personal fall arrest systems," as they are termed by Aniello and other safety experts, encompass everything from how the catwalks are built to what an employee wears. Catwalk-guardrails have top and middle horizontal bars plus kick-

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Mission Hill cellar worker punches down the cap, wearing safety harness with attachment at the D-ring on his back.

plates at foot level, and intermediate vertical rails.

Employees wear body vests with prescribed connectors hooking them to shock-absorbing lanyards. Acceptable anchorage points for the lanyards are I- or H-beams, columns or vessels, horizontal or vertical metal pipes greater than three inches in diameter, and any other anchor capable of supporting 5,000 pounds of weight-pressure.

Breese, Patlan, and the winery team inspect the safety equipment before each use (daily), and offer training to all new-hires, with yearly documentation of inspections, and annual training prior to harvest.

Mission Hill Family Estate (Okanagan Valley, B.C., Canada)

Mission Hill has been owned by Anthony von Mandl since 1981 and produces wines from 1,100 acres of vines in the Okanagan Valley of British Columbia. Red varieties include Cabernet Sauvignon, Merlot, Cabernet Franc, Petit Verdot, Pinot Noir, and Syrah. The Cabernet Franc and Petit Verdot are used for Mission Hill's Oculus Bordeaux blend.

Mission Hill winemaker inspects the cap during pump-over. He wears breathing apparatus to protect from CO_2 inhalation, and the harness is hooked to a lanyard, with monitoring employee nearby.

The winery recently completed a renovation project. Red fermentors were installed in 2005 in two sepa-

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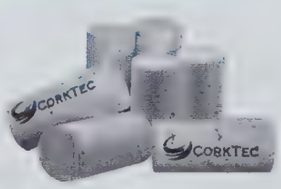

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Ubaldo Dominguez (Moon Mountain Winery) demonstrates a dual safety system. Harness and lanyard are fixed length for very limited freefall potential, with a hand-crank attached so that a second employee can perform non-entry rescue if Dominguez fell into a tank.

rate fermentation areas. One has a dozen 6-ton oak fermentors, and the second has five oak fermentors and ten stainless steel fermentors. Fermentors are accessed from a mezzanine catwalk. Tank openings are covered by a stainless steel grid that is removed for punch down. The two fermentation rooms have handled over 300 tons of wine depending on the vintage.

Dave Fallis, VP of operations at Mission Hill, says that practices vary according to grape variety. "In general, grapes are destemmed, hand-sorted, and gravity-fed into the 6-ton fermentors, cold-soaked for four to seven days, then primary fermentation begins followed by extended maceration. A combination of punch down and pump over is done."

New safety procedures were initiated in 2005 when the fermentors were installed. Procedures were written by the cellar employees and the winery's own Joint Health and Safety Committee.

"At Mission Hill Family Estate, we are very conscious of safety and safety procedures," Fallis says. "The Joint Health and Safety Committee meets monthly to perform audits, review procedures, and report on safety performance. Procedures are developed for all new equipment before it goes into operation, and employees are trained on procedures. Qualification procedures and tests are used where required."

The procedures worksheet for employees in the "Small Vat Lanyard" area begins by identifying all fermentors and areas of hazard and high risk. It explains the CO_2 dangers in and around the vats during harvest, and general tank-area hazards employees might encounter. The worksheet then assigns certain cellar employees to administration, supervision, and performance of tasks, and is used in conjunction with hands-on training before an employee is cleared to work in the small vat area.

Employees are required to work ONLY on the mezzanine above the tanks when top-loading, performing punch downs, collecting samples, or adding sulfur into a tank. Upon entering the catwalk area, each employee dons a safety harness, and connects a lanyard to a network of reinforced guide-wires above the catwalk area. The lanyard remains connected at all times while an employee is on the catwalk, and employees are trained to work with each other and their lanyards to avoid entanglements.

Mission Hill has a variety of CO_2 monitors to protect employees. Automated room sensors are tied into an air exchange system, which will activate if the room level of CO_2 rises to 5,000 ppm. The air system can exchange the cellar's air for fresh in 20 minutes. Hand-held sensors are used to check areas of concern before employee entry, and for employees to carry if they are entering a potentially dangerous area alone.

Updates to safety guidelines

In late 2007, the American National Standards Institute (ANSI) and the American Society of Safety Engineers (ASSE) updated the voluntary guidelines given by members to their clients in all industries, including wineries, for fall protection. Some updates applicable to wineries include attachment of lanyards to harnesses; uses of twin-leg shock-absorbing harnesses; a comprehensive list for company managers of fall-safety team members,

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AND ASSOCIATES

Wairau Aston Estates Winery, Nelson, NZ
Photo: Daniel Allen

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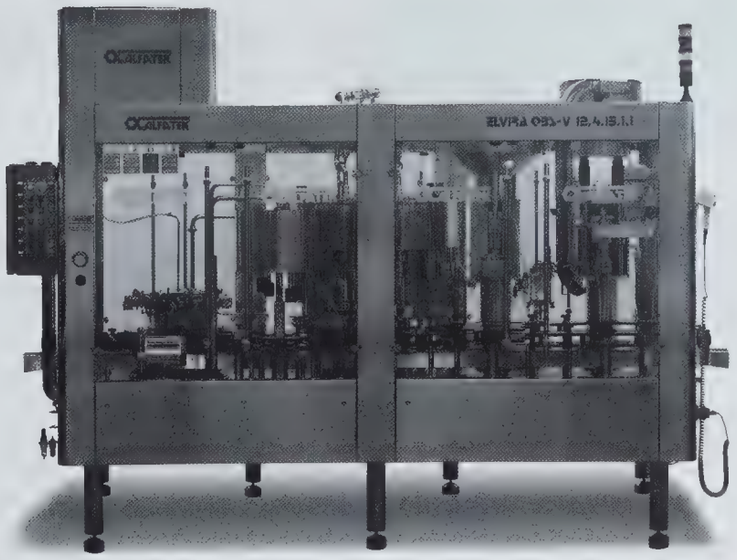

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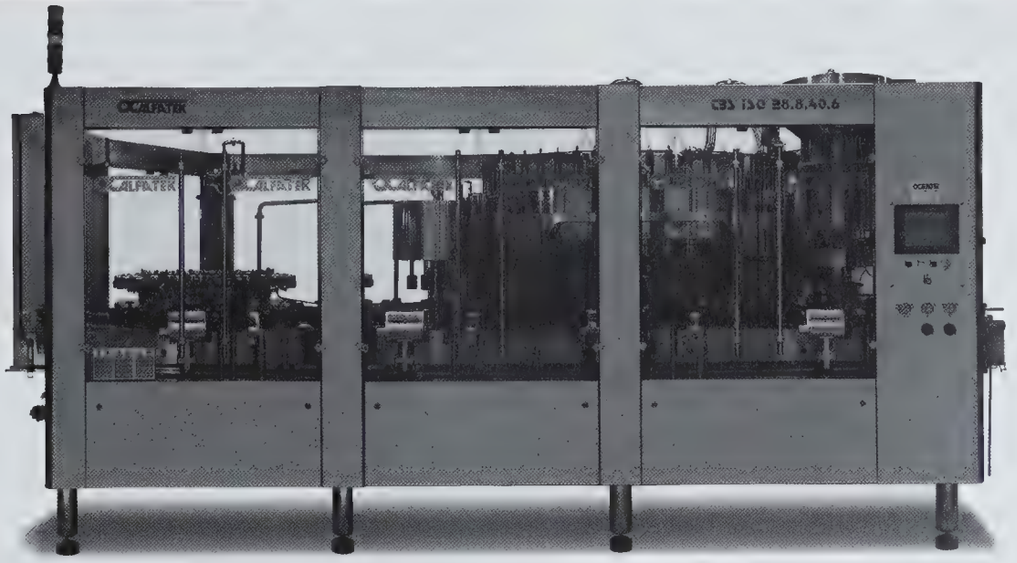

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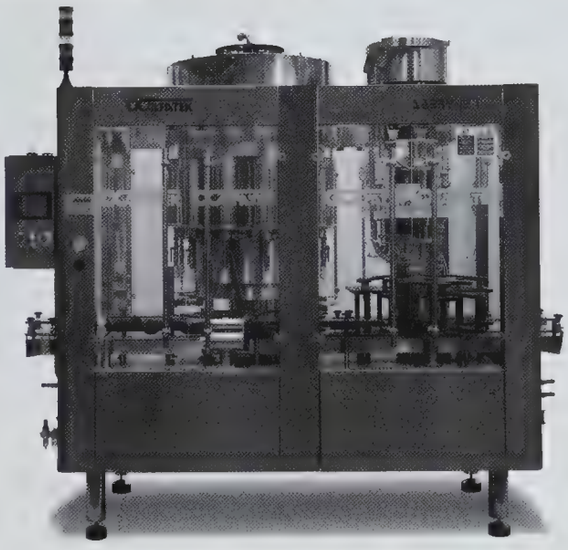

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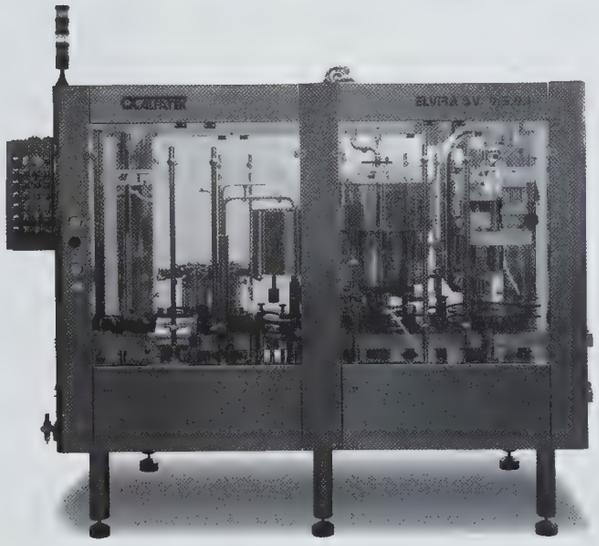

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Matetic Vineyards (Rosario Valley, Chile) decided manual punchdown was difficult, slow, and dangerous for cellar workers, and installed two pneumatic-cylinder punch-down devices for Pinot Noir and Syrah. Winemaker Paula Cárdenas alternates punchdown with pumpover in eight open-top fermentors (7,900 kilos) and eight 5,000-kilo open-top fermentors in a second fermentation room.

with each person's role and responsibilities plus required training; new building codes for architects and engineers to follow; and new requirements for assisted-rescue and self-rescue situations, including equipment and systems. ■

"Capital Safety Updates" document Z359 is available for download at http://www.capitalsafety.com/Default.aspx?tabid=439.

M.O.G. separation table allows automatic removal of M.O.G. and access for manual sorting.

SHAFER VINEYARDS

Whole berry destemming, sorting of red grapes

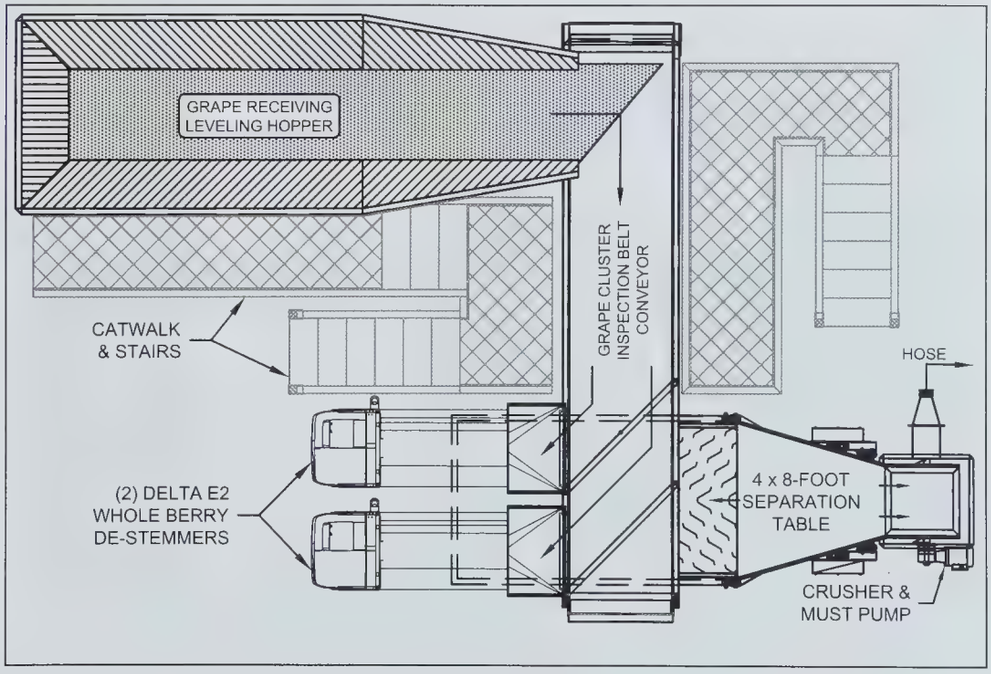
Shafer Vineyards (Napa, CA) installed a grape destemming and sorting system in 2008 that handles a typical daily volume of 40 to 60 tons (average of eight to 12 tons per hour of Cabernet Sauvignon, slightly less for Merlot grapes). Development of the new system began with an initial concept by Elias Fernandez (winemaker) and Stephen Koster (winery process consultant), who collaborated on key elements of a gentle delivery system within a very limited working space and to utilize an existing cast-in-slab stem discharge-conveyor.

Two destemmers were installed to take advantage of the latest technology in whole berry destemming and to meet the desired production level. The equipment was manufactured and installed by Wolff's Welding & Fabrication (Sonoma, CA). Five components make up the system:

The **grape receiving hopper and leveling table** is six-feet wide, 16-feet long, and three-feet deep. The all stainless steel bed receives fruit from ½-ton bins. A variable speed reciprocating eccentric drive levels fruit and provides uniform discharge at the desired volume.

A three-feet wide and 16-feet long **grape cluster inspection table** receives leveled fruit for manual removal of leaves and unacceptable clusters. A variable speed belt conveyor drive provides uniform discharge through two side-outlets at the optimum speed to the de-stemmers.

Two **Bucher-Vaslin Delta E2 grape destemmers** are mounted on an articulating support base that provides 5° longitudinal up or down adjustment that affects residence time of grapes inside the rotating cage. The destemmers roll apart to allow cleaning and service. Each Delta E2 destems grapes inside with a high-density polyethylene cage (with 18mm or 22mm size holes). The custom paddle-shaft has short paddles with a double concentration of paddles in the stem-evacuation area. The wide rubber paddle tips can be oriented to achieve optimum destemming and discharge and are removable to accommodate grape conditions. A variable frequency drive of the cage and paddle-shaft


GRAPE RECEIVING LEVELING HOPPER
GRAPE CLUSTER INSPECTION BELT CONVEYOR
CATWALK & STAIRS
HOSE
(2) DELTA E2 WHOLE BERRY DE-STEMMERS
4 x 8-FOOT SEPARATION TABLE
CRUSHER & MUST PUMP

Shafer Vineyards' grape destemming/sorting system.

accommodates sorting and selection. At Shafer, two Delta E2 machines destemmed at 90% of full motor operating capacity. The new E2 machine was introduced in 2007 to allow wineries to destem at slow or high speeds of three tons per hour up to 15 tons per hour.

The **M.O.G. separation table** allows automatic removal of M.O.G. (green shot berries, dried raisins, and bugs) for disposal. The table is 4½ feet wide x 15 feet long with two four-foot square interchangeable slotted screens. The slots are about four inches long (available in custom widths). The table has a variable speed reciprocating eccentric drive. An optional air blade is available for removal of lightweight M.O.G. that are too large to pass through the slotted screen.

Delta FT202 crusher rollers are mounted on top of a must pump sump. A screw-auger feeds a Waukesha-130 3-inch positive displacement lobe pump with variable speed drive for delivery of must to the fermentation cellar. ■

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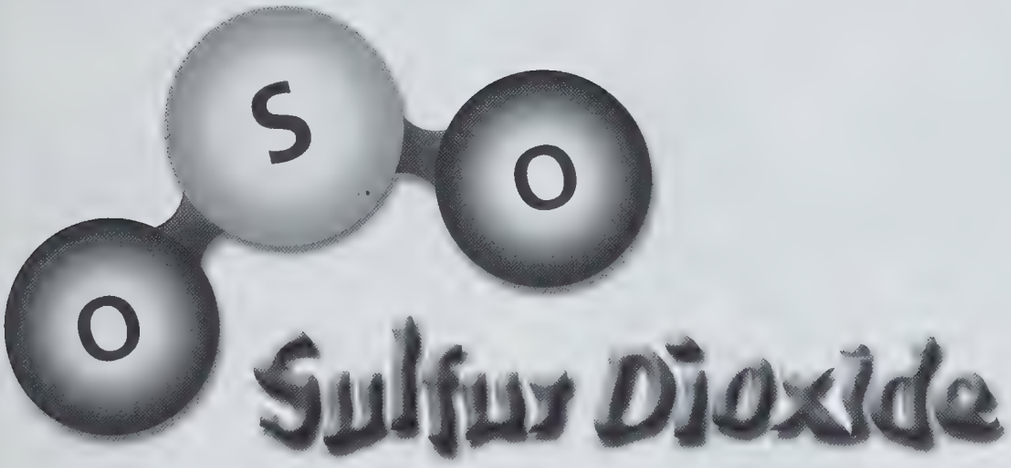


Science behind this anti-microbial, anti-oxidant, wine additive

BY Pat Henderson
Senior Winemaker
Kenwood Vineyards, Kenwood, CA

Sulfur dioxide was first used in winemaking when the Romans discovered that if you burn candles made of sulfur inside empty wine vessels it would keep them fresh and prevent them gaining a vinegar smell. 2000 years later sulfur dioxide, or SO_2, remains without a doubt the most important additive that is used in winemaking.

Used as both an antimicrobial agent and antioxidant, winemakers find it indispensable to preserve wine quality and freshness. However, if used improperly, the effect can be just as adverse as they can be beneficial.

All wines benefit from tender care, whether one is crushing, racking, or bottling, the gentlest method of accomplishing a task is often the best. Just as it is with any of the other tools and techniques a vintner may use, the addition of sulfur dioxide works best when enough is added at the proper time to accomplish the desired task without adding too much and adversely affecting wine quality.

The amount and timing of sulfur dioxide additions depends on the style of wine that is being made and the composition of the wine to which it is being added. While it is possible to make wine without adding sulfur dioxide, you cannot make wine that contains no sulfur dioxide at all. This is because yeast produce a small amount, about 10 parts per million, during fermentation.

When adding sulfur dioxide to must or wine it is important to consider the stage of winemaking that it is in, such as fermentation, ageing or prebottling. You should also consider what the status of the malolactic fermentation is and whether you want to encourage or discourage it, and how turbid or clean the wine is, and how long it will be before the wine is consumed.

Because of these variables and the variation in winemaking styles, every winemaker or winemaking text is likely to have a different answer to the question: "how much sulfur dioxide should be added?" This confusion can be frustrating to novice winemakers but it illustrates one important point; there are few absolute rules of winemaking and depending on the situation and the wine style that is being made there are many options.

Additionally, since there is no "one size fits all" answer on the use of sulfur dioxide in wine, it is important to have an understanding of the chemistry of sulfur dioxide and how it reacts in a given wine before it can be used properly. The subject of chemistry can be daunting for those who have not studied it since high school and the chemistry of sulfur dioxide in wine is no exception. Because of this, some professional winemakers have only a basic knowledge of how sulfur dioxide reacts in wine and the different forms that it takes.

Chemistry of sulfur dioxide

Sulfur is an element found on the periodic table. In its pure form, it can be dusted or sprayed on grapevines during the growing season to prevent rot and mildew from developing. If sulfur is ***oxidized***, it forms sulfur dioxide or SO_2.

Oxidation is the term used by chemists to describe when an element or compound, such as sulfur, loses electrons. While oxidation reactions do not necessarily have to have the presence of oxygen to occur, they often do because when oxygen reacts with an element or compound it readily accepts electrons.

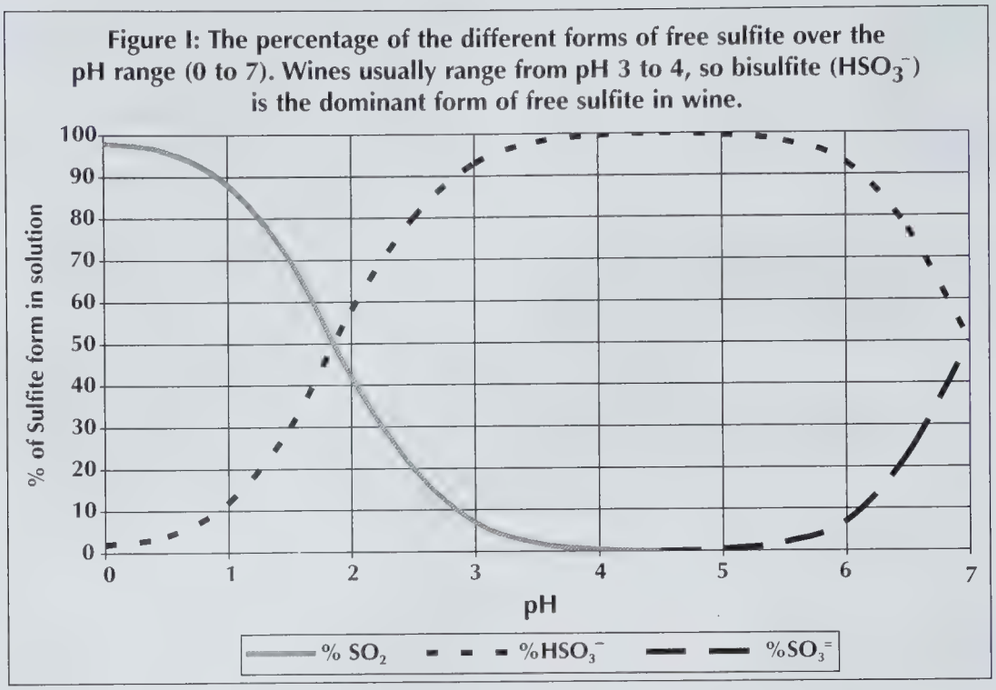
The burning of sulfur in the air oxidizes it and produces SO_2 in the chemical reaction: $S + O_2 = SO_2$.

Sulfur dioxide gas has a sharp pungent aroma that smells like a burnt match, this is hardly surprising because match heads contain sulfur and when they ignite, they release SO_2.

In a chemical reaction where sulfur gains electrons it is said to be reduced. Compounds that are made up of reduced sulfur are called ***sulfides***. Sulfide compounds are characterized by a strong unpleasant odor.

Hydrogen disulfide (H_2S), is a wine spoilage compound that has an aroma that smells like rotten eggs. It can have several causes, but it is most frequently a result of residual sulfur dust present on grapes when they are harvested,

Figure 1: The percentage of the different forms of free sulfite over the pH range (0 to 7). Wines usually range from pH 3 to 4, so bisulfite (HSO_3^-) is the dominant form of free sulfite in wine.



being reduced by yeast to H_2S during fermentation.

Hydrogen disulfide can also be caused by a shortage of yeast nutrients during fermentation. H_2S can undergo further chemical reaction to form compounds called mercaptans. Mercaptans also have strong unpleasant aromas that are reminiscent of cabbage, garlic, and skunk. Although sulfur dioxide and sulfides both contain the element sulfur, there is no danger of added SO_2 forming H_2S.

Sulfur dioxide itself is a gas that readily dissolves in water. Once dissolved, it reacts with water to form new compounds called ***sulfites***. See following reaction:

$H_2O + SO_2 \leftrightarrow H^+ + HSO_3^- \leftrightarrow 2H^+ + SO_3^=$

In solution with H_2O (water), SO_2 is called ***molecular SO_2***, HSO_3^- is called ***bisulfite*** and $SO_3^=$ is called ***sulfite***. The negative signs (– and =) denote the negative charge of the bisulfite and sulfite ions (molecules with a charge are called ions). The double arrows (↔) of the equation denote that the reaction is at equilibrium.

At equilibrium, the rate at which bisulfite ions become sulfite is the

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same as the rate sulfite ions become bisulfite. The reaction between the different types of sulfite is going both ways at a steady state so the concentration of the sulfite compounds remains steady.

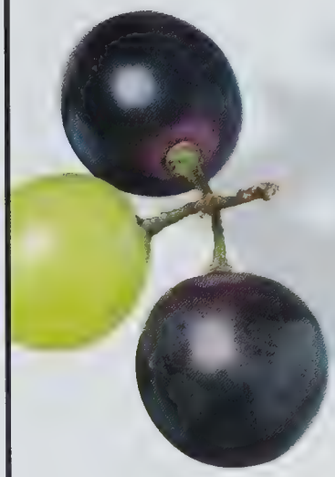
While the concentration of the different forms of sulfites may be steady, it does not mean there are equal amounts of the compounds in solution; the acidity or pH of the water has a huge affect on their concentration. The more acidic or the lower the pH of the water, the more heavily the reaction is weighted to the molecular SO_2 side. The more basic or higher the pH is, the more sulfite that is present as illustrated in the graph (Figure I).

How does it differ when SO_2 dissolves in wine? Since wine is more than 80% water, the reaction, or ***disassociation***, of molecular SO_2 into sulfites happens in much the same manner. Since wine is acidic (between 3 and 4 pH), molecular SO_2 and bisulfite make up the vast majority (99.99% at pH 3.4) of the sulfite compounds present in wine.

Sulfites will also react with other chemical constituents found in wine such as sugars, acetaldehyde, and phenolic compounds. When a sulfite reacts with another molecule and becomes part of its structure it no longer takes part in the equilibrium reaction and it is called ***bound***. Sulfites that still are part of the equilibrium reaction are called ***free***. The combined amounts of free and bound sulfites are called ***Total SO_2***.

The more compounds that are available in a wine for sulfites to bind to, the higher the ratio of bound to total sulfites there will be. Therefore, wines that are sweet or have high solids because they have not been settled or filtered will have a lower ratio of free to total SO_2.

When sulfite binds to anthocyanins (the phenolic molecule that gives red wines their color), the anthocyanins go from a colored to a colorless form. Red wines that receive an SO_2 addition will have a slightly less intense color. This effect is particularly noticeable in light colored reds or rosé wines.



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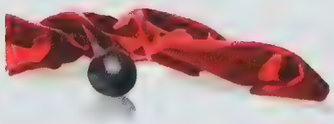

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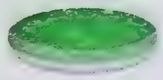

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Figure II: Different forms of SO_2

Total sulfur dioxide			
Free sulfur dioxide			Bound sulfur dioxide
Molecular SO_2	Bisulfite HSO_3^-	Sulfite $SO_3^=$	Sulfites attached to sugars, acetaldehyde, and phenolic compounds

Not to scale

Knowing both the amount of free and total sulfites is very important because only the free forms of sulfites are available for providing a preservative role in wine. This is often expressed as ppm free SO_2/ppm total SO_2 to denote which number is free and which is total; these numbers can readily be determined by chemical analysis.

Sulfur dioxide concentration is measured in parts per million (ppm) or as milligrams per liter (mg/L). A wine with 19 ppm free SO_2 and 51 ppm total SO_2 would be noted with 19/51. The amount of bound sulfites would be equal to the total SO_2 minus the free SO_2, (51 – 19 = 32). For dry table wines the level of free sulfur is usually somewhere around 40% to 75% of the level of total SO_2.

Anti-oxidation role of sulfur dioxide

Oxidative reactions can occur in both red and white wines but are particularly noticeable in the latter. Dissolved oxygen in wine can react with phenolic compounds giving the wine a brownish hue. Another product of this oxidation is the compound acetaldehyde, which has a nutty, sherry-like aroma. Sulfur dioxide is used by winemakers to prevent this oxidation; however it does not act by directly removing oxygen from wines and musts.

Although the sulfite ion ($SO_3^=$) can bind with oxygen, there is almost no sulfite ion present in solution at the pH range found in wine (see Figure I). Rather sulfur dioxide prevents oxidation by binding with the precursors involved in oxidative reactions preventing them from reacting with oxygen or by binding with compounds already oxidized to reverse oxygen's effect. Sulfur dioxide also acts by reducing the activity of the degenerative enzyme tyrosinase (polyphenol oxidase), which is present in juice.

Because of sulfur dioxide's ability to bind with the precursors and the products of oxidation, it can be used as both a preventative and a treatment. For example, an oxidized white wine with a brown tint and a nutty smell can be improved with an addition of sulfur dioxide that bleaches out some of the dark color and binds with the acetaldehyde to reduce the nutty smell.

Antimicrobial role of sulfur dioxide

Sulfur dioxide is a broad-spectrum antimicrobial agent that has an inhibitory affect on a wide variety of microorganisms. The level of sulfur dioxide at which the microbe, either yeast or bacteria, is affected varies widely by species. This variation allows winemakers to use sulfur dioxide to treat microbes in the wine or must selectively and inhibit or kill undesirable microbes without having an affect on the desirable ones.

It has been understood since the early 1900s that only the free forms of sulfur dioxide (and not the bound) have an antimicrobial effect. It was further discovered in the 1960s that molecular SO_2 was several hundred times more effective than bisulfite.

The mechanism for sulfur dioxide's antimicrobial affect works by the sulfur dioxide entering the microbe and disrupting the activity of the enzymes and proteins of the cell. Since only the molecular form of sulfur dioxide can enter through the cell membrane, it is the concentration of molecular sulfur dioxide that controls microbial growth.

Although there is some evidence that a high concentration of acetaldehyde-bound bisulfite inhibits the growth of some species of malolactic bacteria, this effect is eclipsed by the role of molecular SO_2. Since the percentage of free SO_2 that is in the molecular form is dependant on pH, the importance of pH in the effectiveness of sulfur dioxide and the microbial stability of wine in general cannot be overstated.

Affect of sulfur dioxide on yeast and malolactic bacteria

Sulfur dioxide has some degree of inhibitory affect on all yeast; however, the *Saccharomyces* yeast strains that are used by winemakers for alcoholic fermentation are much more resistant to it than "wild" yeasts are. Wild yeast is the term used for a number of non-*Saccharomyces* species of ambient yeast that are present on grapes and in the winery cellar. Wild yeast are sensitive to both sulfur dioxide and alcohol.

Wild yeast can begin a spontaneous fermentation in juice but soon are killed by the alcohol that they produce. At this point, the *Saccharomyces* that is present, either indigenous to the grapes or added by the winemaker, which is more resistant to alcohol takes over to complete the fermentation.

Wild yeast can sometimes be the source of off-flavors therefore most winemakers elect to control them with a small dose of sulfur dioxide and then inoculate the must with a commercial wine strain of *Saccharomyces*. A molecular SO_2 level of 0.4 ppm (equivalent to a free SO_2 level of 20 ppm @ 3.50 pH) will kill wild yeast without adversely affecting *Saccharomyces*.

The inhibitory effect of sulfur dioxide on malolactic fermentation is much greater than it is for the alcoholic fermentation that is performed by *Saccharomyces* yeast. Malolactic fermentation (often abbreviated to ML fermentation or MLF), is the secondary fermentation by bacteria that converts malic acid found in grape juice to lactic acid, which is less acidic.

There are several species of bacteria that are capable of MLF in wine, some more desirable than others. *Oenococcus oeni*, the most commonly used species of malolactic bacteria, is very sensitive to sulfur dioxide and has difficulty growing at levels above 25 ppm total SO_2.

The sensitivity of malolactic bacteria to sulfur dioxide can be used by winemakers to influence the flavor of a wine. MLF has several effects on the flavor of a wine, it lowers the acidity and it can produce a "buttery" aroma,

particularly in white wines. In addition to these sensory qualities, it makes a wine more microbiologically-stable.

If the MLF is completed in the cellar prior to bottling, you do not have to worry about it occuring after bottling and spoiling the wine. If you wish to make a more tart, fruit forward wine such as a Riesling or Sauvignon Blanc, MLF would not be as appropriate and MLF can be prevented by an early dose of sulfur dioxide.

In a wine that will be aged for a longer period in barrels, or if you desire a softer less acidic character, MLF is more appropriate. Chardonnay and red wines often are put through MLF either prior to or during ageing.

Affect of sulfur dioxide on wine spoilage microorganisms

Although there are no human pathogens that can grow in wine, there are a number of spoilage bacteria and yeast that can adversely affect a wine's flavor. The most common of these are *Acetobacter*, *Lactobacillus*, *Pediococcus*, and *Brettanomyces*. All of these are sensitive to some degree to sulfur dioxide but the best results come from a combination of sulfur dioxide and good cellar practices.

Acetobacter is also known as acetic acid or vinegar bacteria. As the name implies, it can grow in wine and produce vinegar (acetic acid). *Acetobacter* can only develop in the presence of oxygen and often becomes a problem in wines that are being aged in untopped containers. It can be controlled with a combination of sulfur dioxide and keeping barrels and carboys topped and full after fermentation

Lactobacillus and *Pediococcus* are both forms of undesirable malolactic bacteria. *Lactobacillus* typically grows in high pH red wines that have a stuck fermentation. It grows on the sugar present from the incomplete alcoholic fermentation and produces large quantities of acetic acid. Because it usually grows in high pH musts (greater than 3.75), sulfur dioxide is less effective. The best treatment is prevention, adding acid to a high pH must, and maintaining a healthy fermentation that completes to dryness.

If *Lactobacillus* has already become established, lysozyme (an antimicrobial enzyme that is effective at high pH), can be added to control growth. *Pediococcus* produces an off-aroma that is described as "vegetal" or "dirty socks" and often comes from cooperage that has not been kept clean. Like all spoilage microbes, it can be prevented by a combination of keeping winery equipment and cooperage clean, adding pure inoculums of yeast and malolactic bacteria for fermentation and addition of sulfur dioxide.

Brettanomyces is yeast that can grow in wine without the presence of oxygen or sugar. It usually shows up

in high pH red wines while they are being aged and it produces an aroma that is described as "barnyard" or "horse sweat." *Brettanomyces* grows very slowly and some winemakers feel that a small amount of its aroma can add complexity to a wine. However, too much of this character can be seen as a flaw and most winemakers avoid it.

Sulfur dioxide usually does not kill *Brettanomyces* but prevents it from growing. As a wine ages, the level of free SO_2 diminishes, and a wine that has been adjusted with sulfur dioxide prior to being placed in barrels may require supplementary additions as it is being aged to prevent *Brettanomyces* from developing.

When to add sulfur dioxide

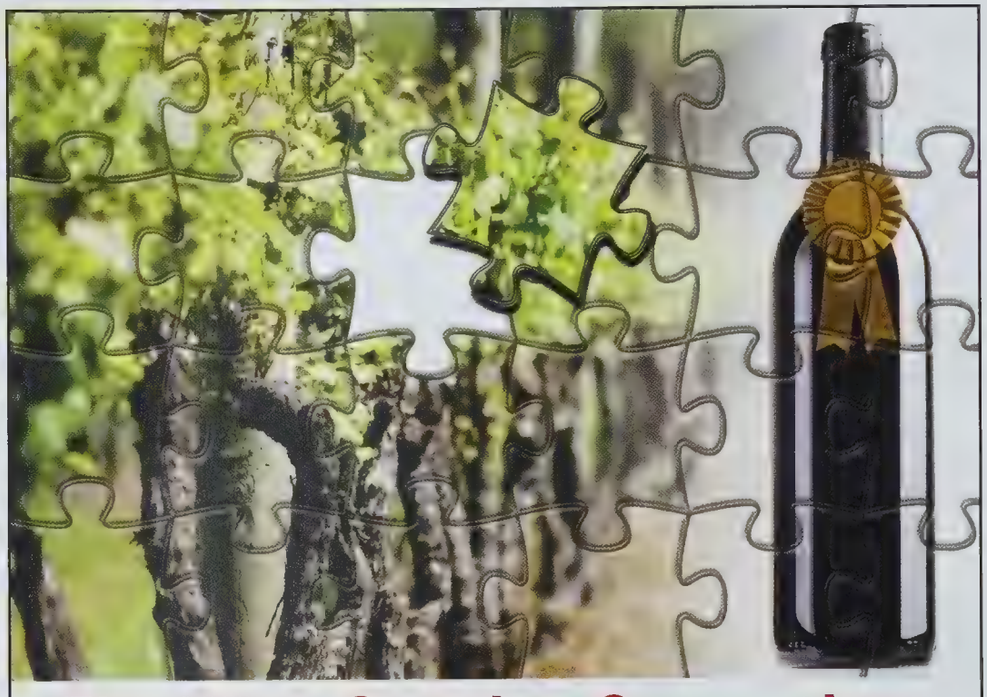
The flavor of white wines always benefits from the preservative nature of sulfur dioxide. The timing of the addition, whether it is added before or after alcoholic fermentation, has a huge affect on a wine's ultimate character. If sulfur dioxide is added prior to alcoholic fermentation, the enzyme polyphenol oxidase is inhibited and less oxidative browning of the juice occurs. This helps to preserve the fruity and floral aromas found in the juice.

The presence of sulfur dioxide will also inhibit malolactic bacteria and help to prevent malolactic fermentation (MLF) from occurring, leaving more of the natural acidity in the final wine. This method is preferred for fruit-forward wines with crisp acidity that will not receive a great deal of barrel ageing.

If sulfur dioxide is not added prior to alcoholic fermentation, more oxidative browning will occur and, within a few days of pressing, the juice will take on a brownish hue. While this dark color may cause alarm, you should not be overly concerned because after fermentation the dark, oxidized phenols will settle out, leaving a wine that is much brighter and more appropriate in color for a white wine.

Since the phenols that can oxidize have been removed from settling and racking, there is less of a potential for the wine to oxidize after fermentation and the wine will be more color-stable and better able to age. This method of pre-fermentation oxidation does diminish some of the fruity and floral aromas in the final wine.

The absence of sulfur dioxide allows MLF to commence after primary fermentation is complete, lowering the acidity of the wine, and making it more microbiologically stable. After MLF is finished, sulfur dioxide should be added to protect the wine. If MLF is not desired, the wine should be adjusted with sulfur dioxide after primary fermentation is complete.



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For red wines, it is a good idea to add a small amount (about 30 to 40 ppm), of sulfur dioxide immediately after the grapes have been crushed. While not absolutely necessary, this will discourage the growth of spoilage organisms such as lactobacillus and allow the yeast to get a good start on the fermentation without competition from other microbes.

By the end of primary fermentation, the majority of the free SO_2 will be bound up by compounds present in the grape skins and there will not be so much residual SO_2 that the growth of malolactic bacteria is inhibited. After MLF is complete, sulfur dioxide should be added to protect the wine during ageing.

For both red and white wines, as they age, free sulfites are bound by other compounds that are present in the wine resulting in a gradual lowering of the effective amount of sulfur dioxide in wine. For this reason, it is always a good idea to monitor the SO_2 level during ageing and to add more as needed.

How much sulfur dioxide to add

Since it is the molecular form (SO_2) of sulfur dioxide that has the most potent antimicrobial effect, and the percentage of sulfite that is in the molecular form is directly dependent on the pH, one must always consider ***both*** the pH and the free SO_2 when determining how much sulfur dioxide to add to a wine.

By knowing the pH, you can determine the percentage of free sulfur that is in the molecular (SO_2) form by using the table in Table I.

For white wines, a level of 0.8 ppm molecular SO_2 will slow down the growth of yeast and will prevent the growth of most other microbes. This level of sulfur dioxide will bind up most of the acetaldehyde in a wine and reduce any oxidation aroma considerably. Therefore, 0.8 ppm is a good target level for molecular SO_2 immediately prior to bottling and will provide the maximum protection for the finished wine.

However, sensitive tasters will be able to detect a slight burnt match aroma at 0.8 ppm SO_2. This is usually not a problem however because few consumers will be able to detect it. Additionally if the wine is bottle-aged for a few months before consumption, the SO_2 will decrease as more sulfites react with other chemical constituents in the wine and become bound. Thus, a wine bottled at 0.8 ppm will decrease to a lower level fairly quickly and there would be no detectable sulfur dioxide aroma.

Winemakers who seal their wine with screw caps know that the sulfur levels diminish more slowly after bottling than wines sealed with corks. In this case, 0.7 ppm would be a better target for molecular SO_2 at bottling.

Table I: Table of molecular SO_2 concentrations over pH

pH	% of Free Sulfur Molecular SO_2	ppm free for 0.8 Molecular	ppm free for 0.5 Molecular
2.90	7.5	11	7
2.95	6.6	12	7
3.00	6.1	13	8
3.05	5.3	15	9
3.10	4.9	16	10
3.15	4.3	19	12
3.20	3.9	21	13
3.25	3.4	23	15
3.30	3.1	26	16
3.35	2.7	29	18
3.40	2.5	32	20
3.45	2.2	37	23
3.50	2.0	40	25
3.55	1.8	46	29
3.60	1.6	50	31
3.65	1.4	57	36
3.70	1.3	63	39
3.75	1.1	72	45
3.80	1.0	79	49
3.85	0.9	91	57
3.90	0.8	99	62
3.95	0.7	114	71
4.00	0.7	125	78

Adapted from: Enology Briefs I (#1), Feb/Mar 1982. University of California Cooperative Extension

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During storage, after all fermentations have completed, white wines can be adjusted to between 0.5 and 0.8 ppm molecular. If the wine is sweet or if you wish to prevent MLF, the wine should be kept at the high side of this range.

Total SO_2 should be kept below 110 ppm for table wines because, at higher levels, the wine can acquire off-flavors. For dessert and fortified wines, that are very sweet, it may be necessary to exceed this limit to obtain adequate free SO_2.

For red wines, a level of 0.5 ppm molecular SO_2 at bottling is an appropriate target. You do not need to keep the molecular SO_2 as high on red wines as you do white wines for several reasons:

First, in most cases, MLF is complete in reds so there is no need to try to discourage it.

Second, red wines are less sensitive to oxidation and their flavor is less dependant on fresh fruity aromas so sulfur dioxide's preservative effects are not as critical.

Third, red wines usually have a higher pH than whites and often it is not possible to adjust the sulfur dioxide to a level that reached 0.8 ppm molecular SO_2 without having too much total SO_2.

By knowing the pH of the wine and using the chart in Table I, it is easy to see what level of free SO_2 is necessary to obtain a given level of molecular SO_2. However, it is more difficult to determine precisely what the ratio of free to bound sulfur dioxide level will be.

Figure III: Formula for PMBS addition

$$\frac{\text{(gallons of wine) x (3.785) x (ppm of addition)}}{\text{(1000) x (0.576)}} = \text{grams of PMBS to add}$$

3.785 is the conversion from gallons to liters
1000 converts mg/L (ppm) to g/L
0.576 is the fraction of SO_2 in PMBS

This formula can be simplified to:
(gallons of wine) x (ppm of addition) x (0.0066) = grams of PMBS to add

When adding sulfur dioxide, the amount in ppm that you add should change the total SO_2 by the same ppm. However, because some of the sulfur dioxide that you add will become bound, the level of free SO_2 will change by a fraction of the amount that is added.

Free SO_2 in wine ranges from about 40% to 75% of the total SO_2 depending on the amount of compounds that are available in the wine to which the sulfite molecules can bind. To approximate what the ratio will be, use the 40% level for wines that are turbid or

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Figure V: Endpoints of Ripper titration for white and red wines

Figure V-a

Figure V-b

At the endpoint of the Ripper titration, the indicator goes from colorless to blue. This is easy to see in white wines as demonstrated in the before and after photos V-a and V-b.

sweet and the 75% level for clean, dry wines.

The higher the level of total SO_2 in the wine, the higher the ratio will be, because there are fewer unbound compounds available for reacting with additional sulfur dioxide as it is added. Sulfur dioxide is also more affective if it is added less often and in greater quantities because it will be more of a shock to the microbes. For example, one addition of 30 ppm will be more effective at killing microbes than two additions of 15 ppm spread several weeks apart.

Forms of sulfur dioxide to add

Sulfur dioxide is available in its pure form as a compressed gas that can be made into an aqueous solution for wine additions. Most wineries use a stable, powdered form of sulfur dioxide called potassium metabisulfite. Potassium metabisulfite has the molecular formula of $K_2S_2O_5$ and is 57.6% available SO_2 by weight. Potassium

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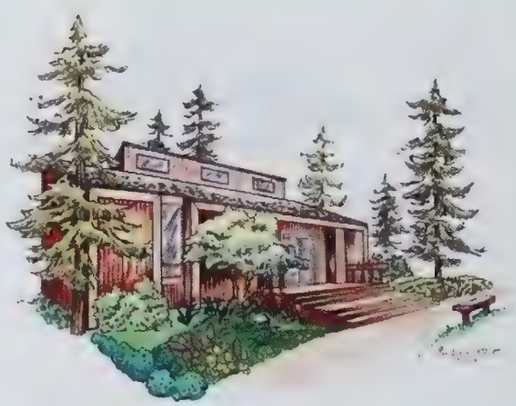

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metabisulfite is usually abbreviated as PMBS or sometimes KMB or KMBS (K is the chemical symbol for potassium).

The formula and calculations for determining how many grams of PMBS you need to add for a given rise in ppm of SO_2 is shown in Figures III and IV. For convenience, pre-weighed effervescent tablets are also available for additions to barrels.

Some wineries prefer to use a premixed aqueous solution of sulfur dioxide rather than PMBS. The liquid is typically 5% to 10% SO_2 by weight and it can be purchased or made up at the winery by dissolving SO_2 gas or PMBS into distilled water. The liquid can be directly added to wine without mixing and the proper amount is measured volumetrically instead of weighed on a scale.

Sulfur dioxide is also available in another powdered form, sodium metabisulfite. Solutions of sodium metabisulfite in water make an excellent sanitizing agent for winemaking equip-

Figure V-c **Figure V-d**

For red wines, the blue color of the endpoint is obscured by the red color of the wine and is less obvious, as shown in the before and after photos, V-c and V-d.

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ment but it should **not** be used for making additions to wine. Although it is not toxic, the sodium in sodium metabisulfite is not healthful and it is best left out of wine.

Measuring sulfur dioxide

The exact amount of both free and total sulfur dioxide in a wine or must can only be determined by chemical analysis. Two primary methods that are used are known as the Ripper method and the Aeration-Oxidation method. Both methods have limitations and require an investment in laboratory equipment and chemicals and a degree of expertise in laboratory practices.

The Ripper method works much better with white wines than it does for red wines. At the endpoint of the ripper reaction, the indicator goes from colorless to indigo blue as seen in a white wine in Figures Va and Vb. The blue color of the endpoint in the reaction is much more difficult to determine in deeply colored red wines as seen in Figures Vc and Vd. For this reason, the Aeration-Oxidation method is preferred for red wines.

If the Ripper method is the only method available, red wines can be diluted 50% before analysis to lower the intensity of the color. Just be sure to double the results to make up for the dilution. Additionally for red wines, the free sulfur dioxide by ripper usually runs slightly higher than the actual amount. After adding sulfur dioxide, wait 24 hours before performing analysis to allow the free SO_2 to stabilize.

Working with sulfur dioxide

Working with the powdered forms of sulfur dioxide is not a dangerous activity but there are certain precautions that should be taken. Sulfur dioxide at the levels that are found in wine are not at a level that are cause for concern however winemakers are exposed to higher levels when they are working with sulfur dioxide solutions.

Fumes of sulfur dioxide gas can irritate the throat and eyes so it is always best to work in a well-ventilated place and to use a respirator when mixing sulfur dioxide solutions. When adding PMBS, first mix the powder in a small amount of cold wate (about 50 g per Liter, [7oz per gal]), then after the PMBS has dissolved, mix the solution into the wine.

Additionally, under highly acidic conditions, the concentration of the more volatile molecular form SO_2 is higher, so you should never mix both acid and sulfites together in the same container when they are being added to wine. A better method is when adding both acid and PMBS is to first mix and add the acid to the wine and then add sulfur dioxide. A very small portion of the population can have an intense asthmatic reaction when exposed to the fumes of sulfur dioxide, so extra care should be taken for anyone with a history of asthma when working with PMBS.

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Figure IV:
Example of a sulfur dioxide addition calculation

A Zinfandel has finished ageing in barrels and has been blended. It needs the sulfur dioxide level adjusted before bottling. The wine is dry and has completed MLF and has very good clarity from settling during ageing. The analysis before the addition is pH 3.45, and the sulfur dioxide is 16/35 and there are 6,000 gallons of wine.

Q: How many grams of PMBS should be added to protect the wine after it has been bottled?

A: Since the wine has completed the alcoholic and malolactic fermentations, a molecular SO_2 level of 0.5 ppm should be adequate to preserve the wine. By looking at Table I, you can see the free SO_2 must be 23 ppm to have a molecular SO_2 level of 0.5 ppm. With the free SO_2 currently at 16 ppm, it must increase by 7 ppm to attain the desired amount.

23 ppm – 16 ppm = 7 ppm

Since only a portion of the PMBS that is added will be free SO_2, it is necessary to estimate what percentage will become free SO_2. Since the wine is clean and dry, we can assume that the ratio will be on the high side of the 40% to 75% range, and we will use 70%.

7 ppm ÷ 0.7 = 10 ppm

To determine the amount of PMBS when adding 10 ppm:

(10 ppm) x (6,000 gallons) x (0.0066) = 396 grams of PMBS

If you wish to convert this to pounds (one pound is approximately 454 grams):

396 grams ÷ 454 grams per pound = 0.872 pounds

For an aqueous solution of sulfur dioxide:

volume of aqueous SO_2 in mL =

$$\frac{\text{PPM addition}}{2.6} \times \frac{\text{gallons wine}}{\%\ SO_2\ \text{solution}}$$

For the wine used in the PMBS example using 5% aqueous SO_2:

10/2.6 x 6,000/5 = 4,615 mL

There is a certain amount of guesswork in estimating just how much of a sulfur dioxide addition will be available as free SO_2, and it is always best to be conservative — you can always add more, but you cannot add less.

Summary

Sulfur dioxide is one of the most effective tools that a winemaker has to protect wine and influence what it will taste like. Deciding when and how much sulfur dioxide to add depends on what stage of winemaking the wine is in and what you are trying to accomplish with the addition. Furthermore, to determine the proper quantity of PMBS to use for the addition, you need to know the pH and free and total sulfur of the wine.

With any technique used by a winemaker, it is important to have knowledge of the science behind the skill. By understanding the chemistry of sulfur dioxide and what reactions that occur when it is added to wine, you can make decisions that are based on your goals for what you want the wine to ultimately taste like rather than just following a "one size fits all" recipe. This allows you to use sulfur dioxide not only as a preservative but also as a tool to influence your wine style. ■

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Tablas Creek Vineyard has calcareous shale, mudstone, sandstone, and limestone from the Monterey Formation.

Paso Robles emerges as a Rhône Zone

BY Eleanor & Ray Heald, Contributing Editors

Why produce a blend of red Rhône-origin varieties rather than single-grape bottlings? Four Paso Robles winemakers maintain that they choose to blend in order to produce better-balanced and richer wines than can be achieved by most single grape red Rhône-origin wines.

An overview of these born-to-be-blended varieties reveals that Syrah in Paso Robles provides blackberry and currant fruit aromas and flavors, complemented by black pepper and smoked meat notes. It often shows a mineral quality like wet stones, but always impacts the mid-palate. There is a vineyard advantage of early-ripening and there is generally resistance to mildew and rot.

In addition to black cherry, pomegranate, and cranberry fruit qualities, Grenache provides acidity and often has black pepper notes. It brings fruit sweetness and softer characteristics to the wine blend. Because it buds early and ripens late, Grenache tends toward higher sugar and therefore alcohol levels as wine. It needs low vigor soil and diligent cropping.

Mourvèdre offers the spine and ageing potential for a red Rhône blend. Some winemakers believe that larger seeds in this variety contribute tannins. Strawberries and ripe plum are fruit hallmarks. As the variety develops, meaty and mushroom characteristics change to fine leather, truffles, and forest floor, which are unmistakable in a blend.

Blueberry, strawberry, and cherry fruit are Counoise distinctive characteristics. With softer tannins and lower sugars than its blending companions, it tames higher alcohols and tannins and contributes unique brown spice notes that are not attributable to barrel selection.

Cinsault likes it hot. Early ripening and high yielding, it rarely goes solo. Its lower tannin profile and a unique spiciness also contributes cherry-like fruit with peppery hints.

Matt Trevisan (Linne Calodo) suggests, however, that "different clonal selections and diverse soil compositions add other nuances and complexities. Hilltop (elevation changes of about 150 feet) Grenache tends to have higher acidity (3.25 to 3.33 pH) and is brighter. Grown at lower elevations, Grenache pH is higher (3.35 to 3.50), contributing to a broader mouthfeel."

Stephan Asseo (L'Aventure) adds that, "depending on soil and clonal selections, more than one style is possible. It is quite complex because when we speak about blends, let's say 1/3 each of Grenache, Mourvèdre, and Syrah, each variety is a blend of differ-

Linne Calodo sources Syrah grapes from Booker Vineyard that has calcareous shale, mudstone, sandstone, and limestone from the Monterey Formation.

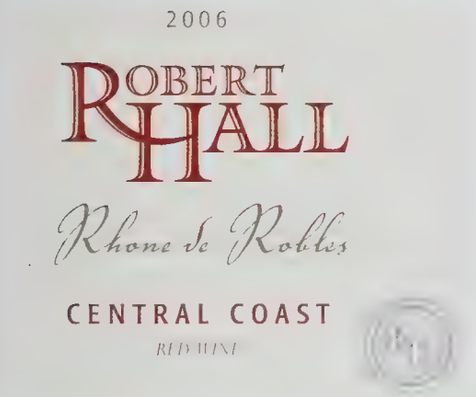
PARTICIPATING PRODUCERS:

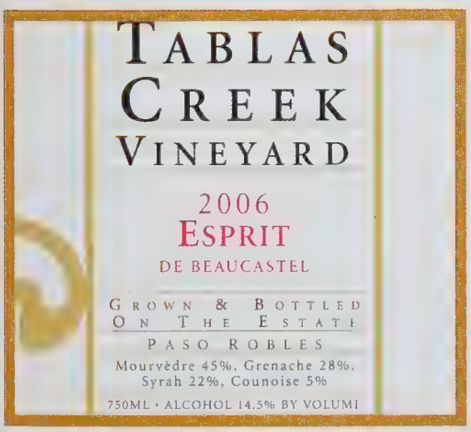
Stephan Asseo, L'Aventure, Paso Robles, CA

Don Brady, Robert Hall Winery, Paso Robles, CA

Ryan Hebert, Tablas Creek Vineyard, Paso Robles, CA

Matt Trevisan, Linne Calodo, Paso Robles, CA





ent clones and different blocks with different exposures, which makes them unique."

All about site

Winemakers contend that region or American Viticultural Area (AVA), exposure, and rootstocks impact fruit and therefore production decisions. "It is all about site," Trevisan says. "Elements such as crop load are affected by soils and rainfall. The balance of canopy and clusters is significant.

"Particularly with Grenache, the flowering period dictates quantity of fruit hanging and cluster position on the vine. Long flowering impacts veraison and obviously picking parameters. There could be a cluster at 22° Brix and another on the same vine that's 28° Brix. Syrah is a lot more even. With Mourvèdre, I'm always waiting for the seeds to turn brown. In a cool year, seeds stay fluorescent green into November."

Tablas Creek has the same variety planted on both north and south-facing sites. "The reason this property was picked," notes winemaker Ryan Hebert, "is because the vision was to plant Mourvèdre on west-facing hillsides with a lot of sun and heat. On the cooler parts of the property, earlier ripening varieties, such as Syrah, are planted."

According to Asseo, "if Mourvèdre does not get ripe, it does not show the varietal characteristics."

Asseo believes it's wise to plant Syrah north and east-facing because it will have more elegance, balance, and finesse. Southwest-exposure Syrah is less complex.

Farming practices

L'Aventure follows organic practices but is not certified. Tablas Creek

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is certified organic (Organic Certifiers, Ventura, CA) with yields kept at 2 to 3 tons per acre. Linne Calodo and Robert Hall Winery are sustainably farmed.

Rootstock/clonal selections

L'Aventure: Grenache 362 on 110R; Mourvèdre Tablas 110R; Syrah 877 and UCD Clone 1 on 420A with Tablas Clone on 3309.

Robert Hall Winery: Syrah, Counoise, Cinsault, Mourvèdre and five blocks of Grenache Noir (several clones) all on 5C.

Tablas Creek: 110R, 140, 3309, and 1103 are used for Mourvèdre, Syrah, Grenache, and Counoise in different blocks.

Linne Calodo: 420A, SO4, and 1103 are used selectively for Grenache 369 and Alban Selection; Mourvèdre 233 and 362; and Syrah 174 and 99 (Estrella clonal selection), 877 and 470.

Training, trellising, and yield

All interviewed winemakers grow respective red Rhône varieties on a VSP trellis, however, Asseo says more grape growers are returning to head-pruning for Grenache.

"It really is a better choice for Grenache," Hebert adds. Tablas is growing it both on VSP and head-pruned vines. "It does a lot better head pruned that reduces pinking and sun bleaching because it has canopy at 360°."

Asseo questions yield consistency with head-pruning and Hebert counters, "since Grenache sets a large crop, it's easy to control yield by bunch thinning to make it consistent. We have to harvest the VSP Grenache multiple times, yet only once with head-pruned vines."

Grenache, Cinsault, and Counoise, Don Brady (Robert Hall Winery) points out "will hang a huge crop of 8 to 10 tons/acre." The Robert Hall vineyard source is rolling hills, so orientation is not centered on exposure, but rather row orientation that is east-west.

However, in order to insure small berry size, Brady keeps a large crop on the vines. "If we reduce yield to 4 to 4.5 tons per acre, vines over-compensate and berry size explodes. Our program includes not only thinning, but a vineyard pass where clusters are shaped and during an early picking, we harvest the south side (approximately 1 to 1.25 TPA) of the vines at 22° to 23° Brix for a Rosé program.

"Remaining clusters (approximately 3.5 to 4 TPA) continue to ripen to full maturity (25.2° to 27° Brix with pH 3.51 to 3.70)."

Controlling yield

For Asseo, controlling yield is most problematic with young vines. Once red Rhône varieties reach 10 to 15 years old, they begin to be self limiting.

"The yield issue," Brady adds, "is also clonal. We work with one 20-plus-year-old vineyard of what we now call 'old California clone.' It does not produce great Grenache. A lot of work has been done in the vineyard to try to improve it, but it has not been successful."

Tablas Creek has the same clone planted and compared to the French clones from Chateau de Beaucastel, it is poor and no viticultural efforts have improved it. "The Perrin family told us early on," Hebert explains, "that Grenache will not make great wine until the vines are at least 20 years old."

Brady believes that supports the concept of a blend from multiple clones or clonal selections. He works with the 'old California clone,' Grenache Noir (which appears to be

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winter sensitive), and the French clones which are not as winter sensitive, but shatter more.

"Shatter thins the crop and I don't mind that," Trevisan notes.

Trevisan sources Syrah across the Paso Robles region from Kiler Canyon Road to Jack Creek Road at the bottom of Templeton Gap, which is the coldest of the vineyards with significant marine influence contributing to a 20°F difference during the day from central Paso Robles. This results in Trevisan picking Syrah at a pH 3.8 to 4.0 in Kiler Canyon to 3.35 closer to the Pacific coast. "That is only a three-mile spread," he explains. He sources higher pH grapes for Zinfandel blends.

"Characteristics of red Rhône varieties change dramatically during winemaking," Brady adds. "Both Syrah and Mourvèdre are reductive varieties and Grenache, Cinsault, and Counoise need less aeration. I've moved these three varieties to puncheons to slow the maturation. Syrah and Mourvèdre are aged in small cooperage."

That's also the reason that Trevisan does only punchdown on Grenache, adding, "I like Mourvèdre because it does come in late in the season and at lower sugars when the seeds get brown.

"To obtain color, Grenache needs to get quite ripe. I press Grenache (fermented whole berry) into barrel, straight from basket presses. It's still holding some sugar. Barrels are topped with Mourvèdre as I'm pressing it. Therefore, it finishes as a cofermentation, starting to move in the direction of a blend."

Irrigation

Deficit irrigation with minimal drip beginning at veraison, if he can hold off that long, is Trevisan's chosen approach.

Asseo has no rules and finds establishing an exact regimen very challenging. "It's important to walk the vineyard," he notes, "read the vines, and interpret what they are telling you."

For red Rhône varieties," Hebert contends, "it's important to plant on hillsides and not at hill bottoms. Irrigation is not necessary there, but it is still too wet, from natural water running off the hills.

Robert Hall vineyard sources are irrigated throughout the season. "We skip the period after fruit set and before veraison," says Brady. "Once we set the canopy, we restrict water."

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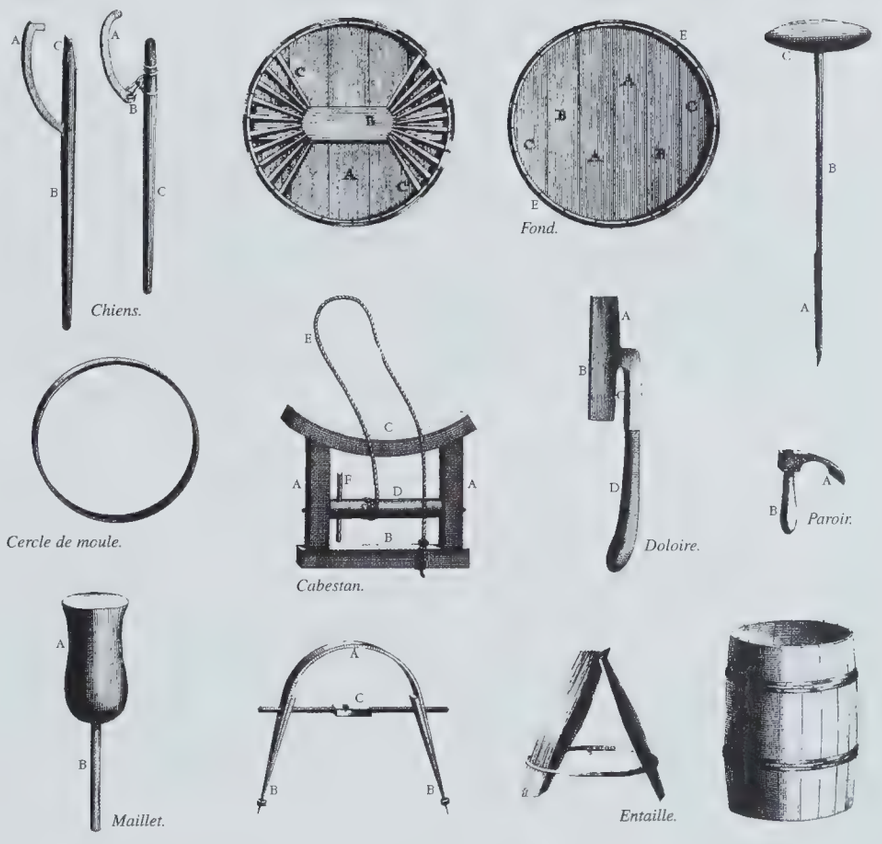

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Harvest parameter averages, all varieties

L'Aventure: 25 to 29° Brix, 3.1 to 3.8 pH, and between 0.50 and 0.60 TA.

Robert Hall Winery: 25.2 to 27° Brix, 3.51 to 3.7 pH, and 0.55 to 0.60 TA.

Tablas Creek: 23 to 26.5° Brix, 3.45 to 3.80 pH, and 0.60 to 0.80 TA.

Linne Calodo: 24 to 28° Brix, 3.25 to 3.55 pH, and 0.50 to 0.90 TA.

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IN THE L'AVENTURE CELLAR

A first SO_2 addition of 40 to 50 ppm is made at crushing. All red Rhône varieties are given a 4 to 7-day cold prefermentation. Fermaid K is added as nutrient (0.20 g/L). No pH adjustment is made.

Fermentation is inoculated with yeast that has the ability to ferment with a high alcohol level and is focused on each specific variety. It completes in 8 to 15 days, on average, but the wine remains on the skins for up to 21 to 28 days.

Peak fermentation measured mid-tank is 85°F. Independent of variety, the wine is always pressed at dryness. "It's difficult," Asseo says, "to evaluate flavors when unfermented sugar remains. It's equally difficult

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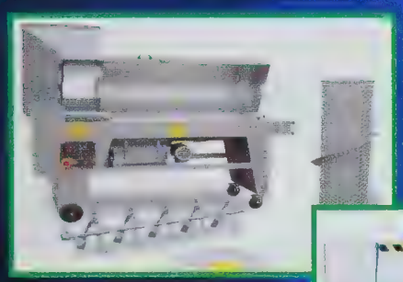

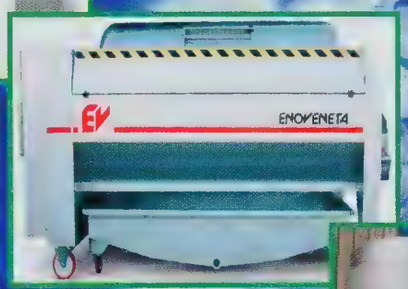

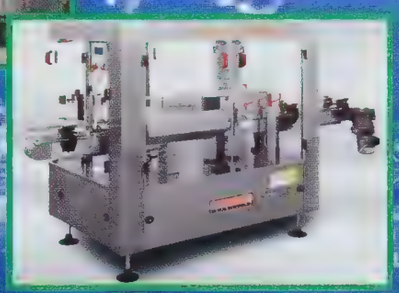

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to discover the specificity of the vintage."

A malolactic fermentation (MLF) inoculum is added. Formerly, the wine was aged in 100% new French oak, but more recently it has dropped (for Rhône varietal programs only) to around 40% with an increasing number of puncheons.

In Asseo's perfect world, cofermentation of varieties is the best way to make a red Rhône varietal blend. "It is the ideal way," he says, "to marry the flavors and offers the best fusion, when it is possible."

In the Robert Hall Winery cellar

Brady explains his cellar regime as different practices. With respect to additions, fruit is destemmed and crushed with the addition of 50 ppm SO_2. Additionally 25 g/ton of HE Grand Cru enzyme is added.

"Typically," he notes, "we harvest Grenache at elevated sugars because that's the indication that the grapes are fully ripe. We bleed some of the juice out and replace part of that with water to lower the potential alcohol."

Tartaric acid addition is made to adjust pH to 3.6 with TA not to exceed 0.75. Juice is inoculated with a prepared starter of a desired yeast strain (1.5 lbs per 1,000 gal) and Go Ferm is added (1.5 lbs per 1,000 gal).

To enhance color and phenolic structure, cofermentation of Grenache, Cinsault or Counoise is done with pressed Syrah skins that are added to crushed fruit when loading a fermentor.

At the first pumpover or end of lag phase, Fermaid K (1 lb per1,000 gal) is added. With the first pumpover, OptiRed (2 lbs per 1,000 gal) is added. On the second day of pumpover, VR Supra tannin (0.50 lb per 1,000 gal) is added to Grenache, Cinsault, and Counoise for a total of 1.5 lbs. On the third day of pumpover, VR Supra tannin (0.33 lb per 1,000 gal) is added to a total of 1 lb.

For temperature control, must is warmed to 70°F if it is below 60°F. Grapes are fermented with the tank set at 75°F for the first quarter of the fermentation, which is generally between 25° Brix and 19° Brix. Then the temperature is adjusted to 80°F for the next 50% (from 19° Brix to 7° Brix).

For the completion of fermentation, the temperature is gradually raised to 85°F. Peak fermentation measured mid-tank is 85° to 90°F and primary fermentation completes in 8 to 10 days. After pressing off the skins, the acidity and pH are adjusted, as needed.

Tank temperature is kept as warm as possible until pressing and is held at

60° to 70°F until MLF completes with X-3 prepared starter.

Wine is racked once following pressing and when dryness is confirmed, it is racked to French oak puncheons (10% to 17% new depending on the variety) with lees filtered to a press lot. A second racking is done mid-January following MLF and wine remains in puncheons until blending in August after harvest. The wine will remain in 2,000 gal oak uprights with 30 ppm free SO_2 at 58°F until bottling.

In the Tablas Creek cellar

Crushed grapes, with 60 ppm SO_2 added, are given a 48-hour cold soak followed by nutrient additions including yeast hulls, Fermaid 2133, and FN150 yeast extract. The pH is adjusted with addition of tartaric acid.

All varieties are fermented in tank with native yeasts. Syrah and Mourvèdre utilize open-top fermentors, punched down manually. Other varieties, which are more oxidative, are in closed fermentors with pumpover.

"We do not do rack and return," Hebert notes. "We tried it and we did not like the effect on the wine."

Fermentation completes in 10 to 16 days, reaching a peak fermentation temperature of 90°F, measured mid-tank. After pressing, the various wines are racked, and undergo MLF naturally.

Prior to blending, only 5% of the Syrah is barrel aged in French oak. Grenache, Counoise and Syrah are blended and aged for 12 months in 1,200 gal neutral French oak foudres.

"We are not big into oak," contends Hebert. "For Tablas Creek, we like to have a very light spice from oak and that is all."

The blend receives a 3µ polish filtration before bottling. Côte de Tablas is bottled in April and Esprit de Beaucastel in May following harvest.

In the Linne Calodo cellar

Trevisan destems and also, depending on color of the stems, does some whole cluster fermentation. With Grenache, he ferments whole berries.

Each variety is given pre fermentation skin contact (3 to 5 days). No nutrient addition or pH adjustment occurs. First SO_2 addition (20 to 40 ppm) is made at 8 to 12 months.

If inoculated, D254, UV41, and D80 yeast strains are used and fermentation completes in 17 days, reaching a peak fermentation temperature of 88°F, measured both in the cap and mid-tank.

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During fermentation, several drain and returns are completed. "Rapid return of liquid," Trevisan explains, "insures that the cap becomes completely submerged. It does not form a cap again for approximately 30 minutes. "Racking and pumpover sprays the top of the cap and it is never completely submerged. With delestage (drain and return) it is."

Pressing occurs after about 20 to 30 days on the skins and that's when Trevisan begins the blending process, particularly with Syrah and Grenache.

MLF occurs in barrels without inoculation. "Because the pH is low, Grenache will not go," contends Trevisan, "but once I top it with Syrah, it rolls." Wine is aged 15 months in barrels before bottling (unfined and unfiltered).

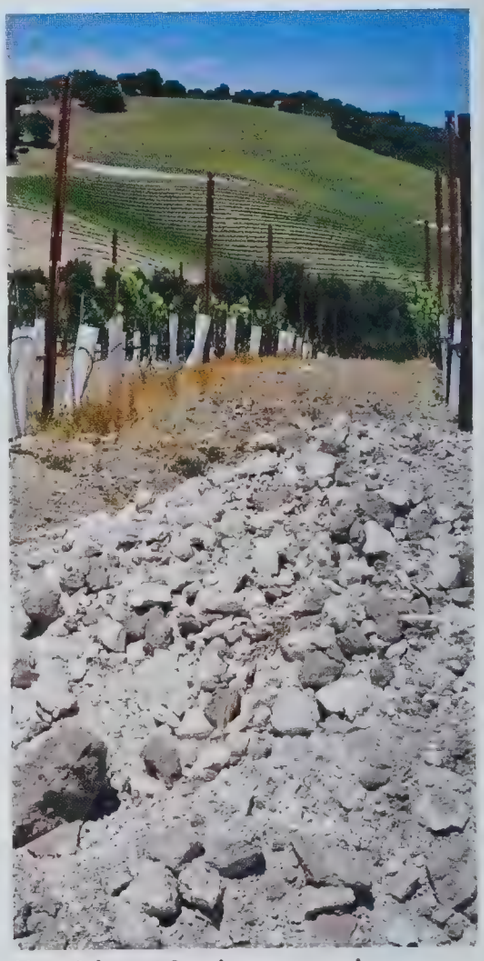
"I like oak," Trevisan says. "To me, it's all part of the seasoning — middleman between the vineyard and oak forest." He uses between 10% and 30% new French oak and some Hungarian. "I like craftsmanship in barrels," Trevisan continues, "Each cooper building his own barrel and crafting the flavors — not so much aiming for consistency. When I blend, I look for differences in barrel."

Last drop

"If growing red Rhône varieties and making a great blend was easy," concludes Tablas Creek's Ryan Hebert, "it would not be interesting. Some of the best wines we've produced have had long and worrisome fermentations.

"If Mourvèdre was easy to work with, it would not be an interesting grape and the wine would not be interesting. As far as risk, basically if something has not completed as expected and winter sets in, we add SO_2, forget about it and in Spring, when the cellar warms up, it finishes."

Three other winemakers nodded in agreement ■



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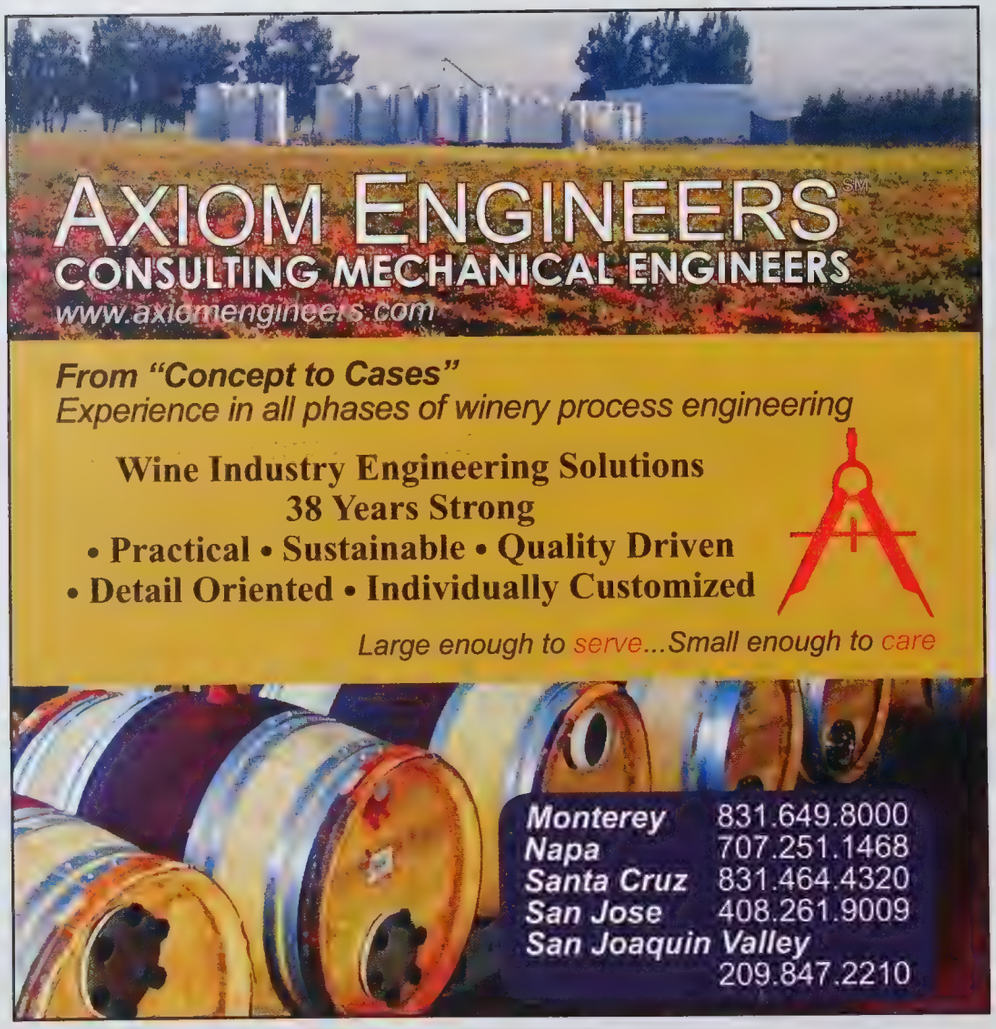


TASTING NOTES

2005 L'Aventure Côte à Côte Estate — $75

Blend: 34% Grenache, 33% Mourvèdre, 33% Syrah

Color/Aroma: deep color; rose petal, cherry-bramble, cocoa, some spice, and rich molasses.

Flavors: boysenberry, big upfront fruit, juicy middle, roasted meats, smoke, coffee, good acidity, oak, and tannin prevalent.

Balance/Finish: super ripe, full body, good balance, smooth and long.

2006 Tablas Creek Côtes de Tablas — $25

Blend: 72% Grenache, 11% Syrah, 9% Mourvèdre, 8% Counoise

Color/Aroma: medium brick red; more red fruit (strawberry) than black fruits, currents, and raspberry.

Flavors: strawberry, cherry, raspberry with some minerality.

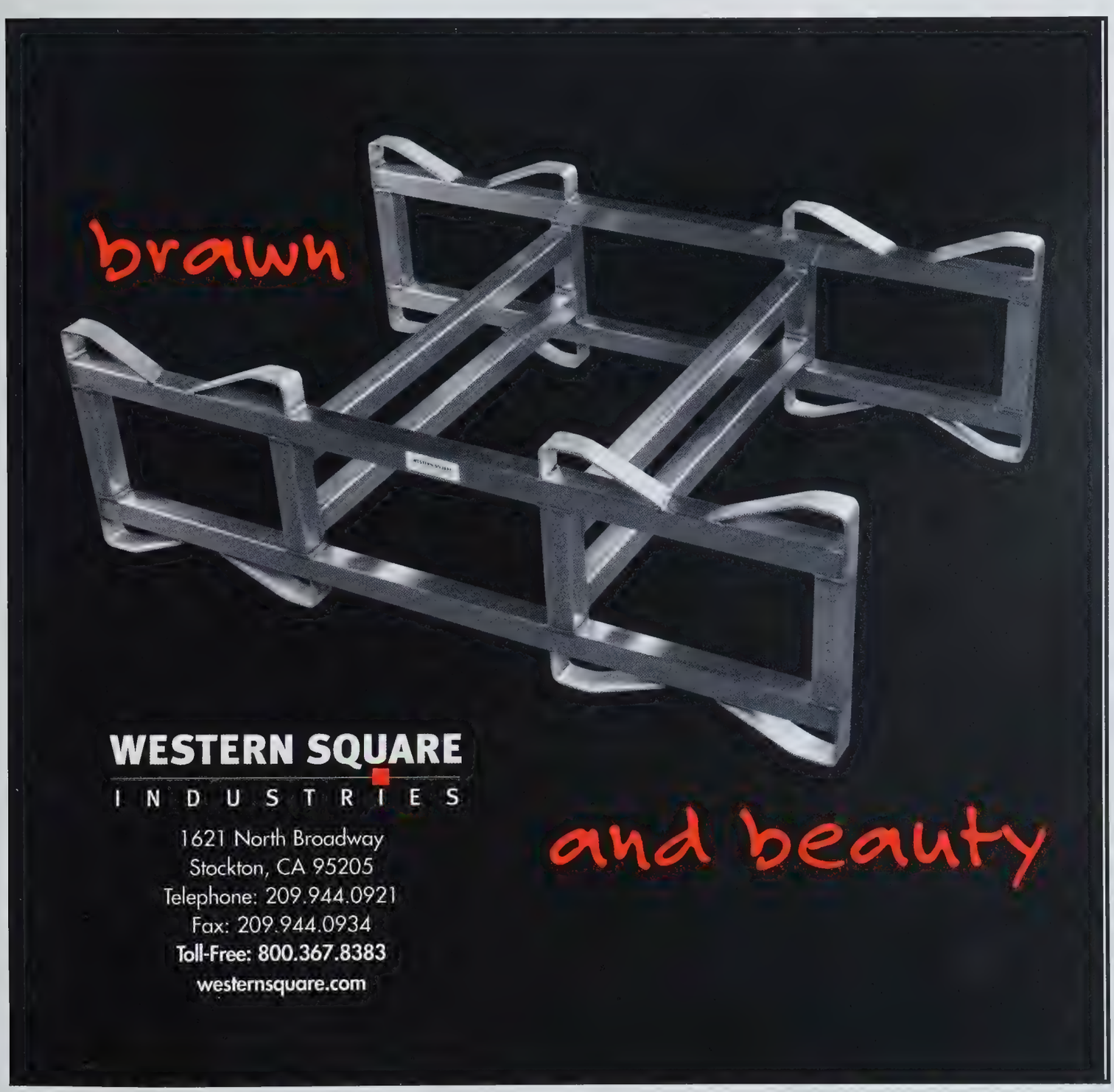
Balance/Finish: full and round, sweet, soft tannins, medium body, very well balanced with a smooth and long finish.

2006 Robert Hall Rhône de Robles — $20
Blend: 46% Grenache, 45% Syrah, 6% Cinsault, 3% Counoise
Color/Aroma: medium ruby; raspberry, fruit with meaty, jammy quality, and smoky notes.
Flavors: very fruity, strawberry, and plum.
Balance/Finish: fleshy middle, excellent fruit upfront with long smoky finish.

2005 Linne Calodo "Sticks & Stones" — $65
Blend: 62% Grenache, 24% Mourvèdre, 14% Syrah
Color/Aroma: Medium ruby red; vibrant, fruity, cassis, strawberry, plum, and raspberry.
Flavors: cherry, sweet oak, cured meat, and dark fruits
Balance/Finish: soft attack, big, fleshy middle, ripe medium body, persistent, and well balanced.

2006 Tablas Creek Esprit de Beaucastel — $45
Blend: 45% Mourvèdre, 28% Grenache, 22% Syrah, 5% Counoise
Color/Aroma: Deeply colored; floral, raspberry, bright berry, strawberry, underlying sage, savory, and cinnamon.
Flavors: bright, raspberry, earth, and leather.
Balance/Finish: Nice attack, ripe tannin, broad mouthfeel, full body, and long length.

2006 L'Aventure Côte à Côte Estate — $85
Blend: 40% Mourvèdre, 30% Grenache, 30% Syrah
Color/Aroma: Dark ruby red; concentrated, violet, strawberry, blackberry, and dark cherry.
Flavors: strawberry, blackberry, dark cherry and anise-like spice.
Balance/Finish: Soft but rich with big, ripe integrated tannins, and long finish.



FIVE STEPS

Prepare your winery/brand to avoid becoming a fire sale

BY Ellen Hunt, Partner, Scion Advisors

Nearly 1,000 family-owned wineries on the West Coast expect to go through an ownership change within the next decade and may be caught in a buyer's market. Highly-established icon brands in California, like Stag's Leap Wine Cellars and Duckhorn Wine in Napa Valley, have been handsomely rewarded for their years of hard work, but many wineries will end up as real estate sales, with little to no value allocated to their brand.

"We can expect a bell curve of sales," says Bill Price, founder of the Texas Pacific Group and a veteran of wine industry acquisitions. "A" brands will be the primary target of the first wave over the next two years, followed by a second wave of the "B" brands that prepare their businesses for a successful sale.

Whether you exit as a brand sale, or end up as a fire sale, will depend on what you do well in advance to increase the value of your business. Get started by following the "five important steps to maximize brand value and business assets" listed below.

How long will it take to increase the net worth of my business? Most owners do not have an effective ownership exit or transition plan in place, according to the report "Ownership Transitions in the Wine Industry" conducted in February 2008 by Silicon Valley Bank and Scion Advisors. [See ***PWV***, May/June 2008.]

A successful exit strategy begins long before the actual sale or succession. This is normally a two- to five-year process depending upon several factors:

1. The health of your business and your brand,
2. Its appeal to a buyer who is willing to spend the right kind of money,
3. Your realistic perception of what your business is worth,
4. A strong team of advisors who can drive a successful sale, and
5. *Your readiness as a business leader to step aside and move on to new projects.*

Business owners who succeed intergenerationally, such as the Antinori family (23 generations), or who exit through sale such as Duckhorn Wine and Stag's Leap Wine Cellars, do a good job maximizing the value and the returns from their business assets.

How to build a business that is worth more

Most buyers will be looking for a business with an upside and they will be assessing the risk very carefully. Ideal winery candidates must demonstrate several years of consistent growth in profitability and have the ability to generate around $2 million in EBIDTA (Earnings Before Interest, Taxes, Depreciation, and Amortization).

Your baseline goal is to obtain the best return you can from your hard work and have a business at the end of it all that provides financial stability. This holds true whether you seek to sell your winery to an outsider, to your employees, or to your children. Even if you plan to remain in your business for the next 10 years, the net worth of your business has an immediate impact on your income and your ability to raise growth-financing and equity.

FIVE IMPORTANT STEPS TO MAXIMIZE BRAND VALUE AND BUSINESS ASSETS

1) Develop a winner's attitude: Be prepared for the unforeseen

Run your business as if you plan to sell it within 10 years. "This philosophy focuses wineries on improving performance by applying more effective, commonsense business practices,"

asserts Hank Salvo, Scion Advisors partner and retired Robert Mondavi Winery CFO.

Faced with a key investor's sudden departure or a family member's illness or death, you may have unexpected financing needs. You may find yourself in "garage sale" mode — selling at a huge discount, unable to sell in time to prevent bank foreclosure, or to realize a proper return on your investment in the business.

Preparing a marginally performing business for sale in some industries can take 12 to 18 months, but due to the asset-intensive nature and market idiosyncrasies of the wine industry, the process can take two to five years. On short order and faced with the unforeseen, it is nearly impossible to position your business to suit the needs of a viable buyer.

2) Stop and take stock

"You need an outsider's perspective," observes Erle Martin, CEO Crimson Wine Group. "Owners have a hard time assessing their own weaknesses. A good analogy is how difficult it is to assess your own wines because everyone develops a 'house palate.' Winery owners become myopic, focused on their neighbors, mired in day-to-day operations and can lose valuable perspective. If I were thinking of selling, I would hire someone like Scion Advisors to do a diagnostic scorecard, and then focus a plan on those areas that need fixing."

3) Define what success looks like for you

"Having clearly prioritized your desires is important — if you don't know where you're going, any road will take you there," says Bill Price. A clear vision of your goals and objectives allow you to make the best decisions related to your exit strategy.

You must see your business through the eyes of a potential buyer. You will need to identify your optimal buyer's

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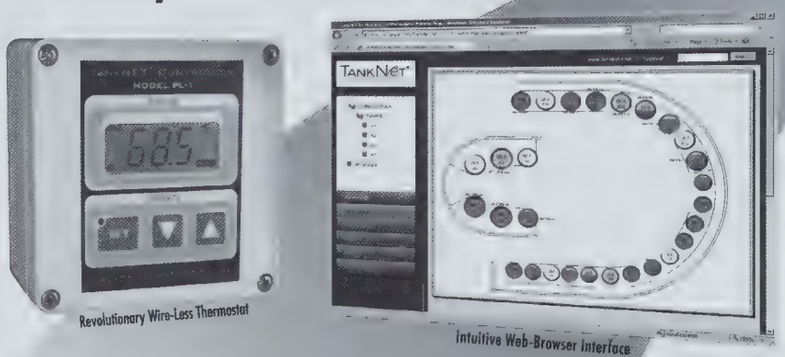

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profile and understand what they are looking for and what value drivers they will use to determine an offer price for your business (see **Types of Buyers**).

Robert Nicholson, President of International Wine Associates, is quoted in a June 2, 2008 *Forbes* article: "Jeffrey Hopmayer is prowling California's wine country. Hopmayer, chief executive of privately held Sapphire Brands of Nashville, TN, says he expects to make ten such acquisitions over the next five years."

There is currently a surge of private equity and other buyers in wine, but as Nicholson also reflects, "Bottom line is there are only realistically one, maybe two qualified buyers on most qualified deals today."

4) Plan your transition

The first phase in your transition planning process involves *getting your business ready* for the right brokers and their buyers. This will typically take two to three years, and this is where a firm like Scion Advisors can help.

"Working closely with several owners in recent years, we have seen their commitment and our process generate serious results, such as growing EBIDTA by five times in three years, and building profitability through doubling average profits per case with a more rationalized product and channel strategy," says Scion founding partner Deborah Steinthal. "At the core of each of these successes was a realistic plan and an aligned group of owners."

The second phase is about *finding the right broker and buyer*. "Today's deal makers will choose carefully when and with whom to negotiate," says Nicholson. Their cost of identifying and negotiating a deal for a potential buyer is huge. They have to research your business, then do due diligence following a memorandum with a potential seller. Once they develop a realistic valuation of your business, they have to figure out how to negotiate a price and contract that meets the needs on both sides of the deal.

Buyers choose their deals with a careful eye on timing today. They ask themselves:

1. Are they too early? Is the seller really ready to sell their business?
2. Does the business have too many problems?
3. How much money will they need to invest to get a worthwhile return?
4. How fast can they get that return?

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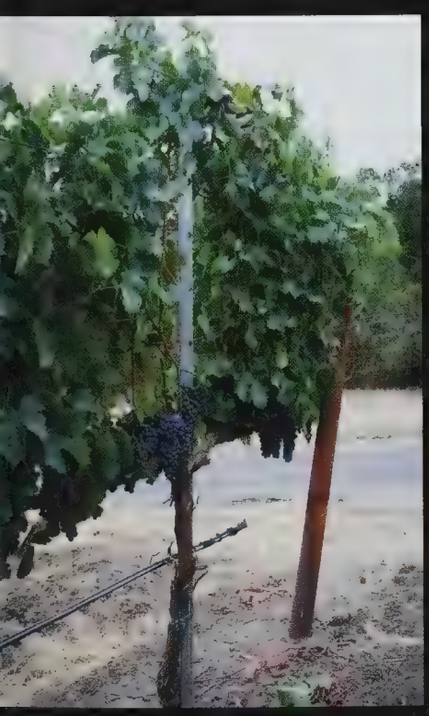

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Types of Buyers

To begin the ownership transition process, you must see your business through the eyes of a potential buyer. You will need to identify your optimal buyer's profile and understand what they are looking for, and what value drivers they will use to determine an offer price for your business. Fundamentally, there are two types of buyers: strategic and financial.

Strategic buyers

A strategic buyer is focused on how well your brand fits into their existing wine business. Frequently the buyer looks at whether your products round out their portfolio mix by adding either wine or geographical diversity, or both. Other primary considerations include access to new markets, increased market share in existing markets, and additional leverage within the distribution network.

For example, in July 2007, Italian winemaker Marchese Piero Antinori teamed up with Ste. Michelle Wine Estates (Woodinville, WA), to purchase Stag's Leap Wine Cellars in order to improve their muscle in the national market.

Another type of strategic buyer is one who is looking to enter the wine business and decides it is cheaper and faster to buy an existing wine brand rather than to build one from scratch.

Both types of strategic buyers are typically making a long-term commitment to the business. However, strategic buyers are quickly drying up and are starting to hone their own portfolios by selling off some of their winery purchases. Constellation, the world's largest wine company, recently sold six winery brands to Ascentia Wine Estates and their production facilities and vineyards to VinREIT.

Pro: Because of perceived market synergies and potential cost savings in combining two businesses, strategic buyers are often willing to offer you more for your business than a financial buyer would.

Con: A strategic buyer is more likely to eliminate part or all of the existing management team if there are redundancies, resulting in cost savings and potentially higher profitability. The result could be damaging to your existing company culture and lead to alienation of loyal customers and employees.

Owners are often too close to their businesses to conduct an objective assessment of their gaps and opportunities.

Build Six Critical Value Drivers

1. Brand strength and sustainability
2. Distribution network
3. Customer loyalty (trade/consumers)
4. Cash flow and profitability
5. Strength of management team
6. Vineyards in highly desirable locations

You need to be able to objectively assess the strength of your business in these areas and then take appropriate, many times painful, actions such as eliminating poor performers in the organization or divesting of non-strategic family assets.

Financial buyers

Financial buyers typically seek to invest in undervalued companies where they can apply their financial and management expertise to create value that will be realized when they exit the investment in the short- to mid-term. They typically view the value drivers as consistent cash flow and a portfolio of wines with solid market position and strong growth potential.

An example is the recent acquisition of Duckhorn Wine by GI Partners, who were looking to invest in a strong wine brand to expand their existing portfolio of investments. They view the wine industry as viable with significant growth potential and, unlike many financial buyers, they are not opposed to asset-based investments and a mid- to long-term investment horizon.

Pro: These buyers can be flexible and creative in how they structure a deal, allowing for current management to retain upside potential. Because many of the existing employees may remain with the company, there may be less disruption of the business and existing customer relationships.

Con: The deal will often require ongoing involvement of the owner for some period of time. In addition, since financial buyers often employ significant leverage, the due diligence process can be more arduous and protracted as there will likely be a lending institution involved.

Conclusion

It is likely to be a buyer's market for the near future, and the needs and interests of the buyer pool are constantly evolving. This is where a business advisory firm with knowledge of the wine industry, like Scion Advisors, can help.

5) Build your transition team

Preparing for a sale to a third party or to your kids can be daunting and highly disruptive to your day-to-day business operations. To minimize distractions, limit the involvement of your internal team and clarify who will deliver focused communications, gather information, and interact with potential buyers.

Along with your internal team, outside trusted advisors can be invaluable help in accelerating your learning curve, and can provide insight, clarity, and objective guidance in a process

that can be both complex and emotionally taxing.

It all comes down to brand strength and financial performance

At a 2008 industry conference, Dan Duckhorn stated that "Brand is paramount to a successful sale." Avoid being a fire sale. You will have a much better opportunity to come out ahead by taking control of a transition plan that maximizes brand strength and financial performance.

This is where a firm such as Scion Advisors can help you end up with a stronger, more profitable business. An advisory team will work alongside you to generate a clear vision of your desired future, properly assess your business, and prepare strategically to build a business that is worth more. ■

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MARKETING DILEMMA

Balancing regionality with American Viticultural Areas

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With the proliferation of brands today, individual wine products must be clearly differentiated to be successful. Once regarded as a luxury good consumed by an elitist few, wine has been democratized and is enjoyed by a much wider socioeconomic range of increasingly sophisticated consumers.[5] These consumers seek the fuller story on where their wine comes from and value a wine more greatly when it comes from somewhere rather than nowhere.

Napa Valley (top), Alexander Valley, Sonoma County (bottom photo)

Regional brand image is therefore gaining in importance.

Today wine marketers often have available multiple overlapping regions from which to choose in the labelling of their wines. With these choices come two questions: Which regional brand is best regarded and therefore of most value to the wine

marketer? Is the more specific region the best choice?

Literature perspectives

Consumers have come to recognize and value a sense of place across product categories, especially food. I. Tzimitra-Kalogianni *et al.* found that one of the most important wine attributes for Greek consumers is appellation of origin.[31] What follows in this section is an overview and a form of meta-analysis of the current knowledge base as it relates to the marketing practicalities of the regional origin of wine, contrasting the New and Old World paradigms, and in the process providing some insightful perspectives.

Famous places

The place of origin — where a product is grown, raised, produced, or packaged — can be used to signify quality. There are many examples, including Bordeaux wines, California raisins, New Mexico chile peppers, Evian mineral water, Belgian chocolates, Kentucky bourbon, Dutch tulip bulbs, and Virginia's Smithfield ham. All of the examples use a specific geographic location as a significant component of their marketing success.[28]

There is a special appeal about the link between the regional denomination and food commodities for both consumers and producers.[27] For the producer there is pride of place and association with a region, however large or small. For consumers there is a more layered picture of the product's origin. Regionally denominated food and drink satisfies a current nostalgia for the "real" and "authentic."[10]

C. Felzensztein *et al.* and B. Martinez-Carrasco note that the place of origin for an agricultural product is often used as a positioning feature, which

ABSTRACT — This paper has been edited from the first publication in *Journal of Wine Research*, December 2007, and explores and provides a literature meta-analysis of the relationship between American Viticultural Areas (AVAs) and their concurrent geopolitical regions (counties). The ever-increasing number of AVAs results in a fragmented offering in terms of the place-of-origin marketing strategy to consumers and is not desirable, especially when the AVA is not represented along with a regional context. Most AVAs have very weak regional brand strength when compared with that of their corresponding counties. The industry bias toward marketing unknown appellations could therefore be enhanced by reference to strong, value-laden regional images. The nature and strength of these regional brand images should be determined through directed research efforts first.

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creates a sustainable competitive advantage that raises a product out of mere commodity status.[13,23]

J. Bruwer provides a conceptual definition of a regional wine brand image: "a held perception (or belief) about a bounded wine area space that is usually holistic and multi-dimensional in nature, the elements of which are 'glued together' by inter-related winescape elements and/or the people and natural and physical attractions within it."[3,17]

Regionally-branded wine encourages consumers to trade up from the more generically-labeled wines that may have first caught their interest.[2] There is a factor of boredom inherent in varietal marketing as well. J. Halliday and H. Johnson note that wine buyers especially become fatigued, uttering, "not another Chardonnay!"[16] The French approach has historically guarded against this issue by emphasizing place of origin.

The French call it terroir

Wine from a defined place of origin has been characterized by the French wine community as an expression of *terroir*. The notion of terroir has now been embraced by most of the wine writers in the world. Three levels of terroir are often ascribed to the identity of a wine, namely *macro-terroir* (country, region), *meso-terroir* (district, locality), and *micro-terroir* (site, or possibly a grouping of sites).[1] Beyond the viticultural and site dimensions, terroir can be used as an image for a winegrowing region.[30]

The identification and delineation of different *terroirs* go back at least to the Benedictine and Cistercian monks of the Middle Ages, if not further.[16]

American producers have sought to give their wines greater gravitas by laying the French "division of geography" on the American landscape. With the government's blessing, American Viticultural Areas (AVAs) have evolved in a piecemeal fashion across the U.S.

The interpretation of the French AOC system has been much broader and much more lenient in the U.S., a New World player. The then Bureau of Alcohol, Tobacco & Firearms (BATF), which is now known as the Alcohol

and Tobacco Tax & Trade Bureau (TTB), did not make quality distinctions or pronouncements, as in France, but simply divided up the land into named places. This government agency, overseeing wine regulations and labelling, tried to please everyone, and ended up with appellations that some cite as meaningless.[9]

The AVA system is a classic case of American "envy" of the Old World's wine industry. The impetus, verging on a craze, for AVAs almost surely arises from envy of the French appellation system and a simplistic notion that its values and implications can be automatically transplanted here.[20]

While AVAs establish where the grapes are sourced to make a wine, they do not offer any other establishment of quality. Wendell Lee, a San Francisco attorney who represents the Wine Institute industry trade group, notes that the federal government's regulations simply aim to provide information and prevent consumer deception.[12] Yet implicit in using an appellation on a label is the suggestion that a quality differentiation makes the wine worth more than it would be otherwise.

The present-day strong recognition of New World wines is well-deserved. Yet making comparisons and parallels to the Old World comes with difficulties. Many years ago, Max Lake, in writing about the great wines of Australia, stated that he was at some pains to avoid any comparison with Old World wines because Australian wines were simply so different.[19] He is right in that many who embrace the Old World and its approach to wine might be doing themselves an inadvertent disservice, missing out on some really good wines.

While in Burgundy, the precise classification of the landscape helps to define and sell the wine, the same approach is not always successful in the New World. The key is therefore to find the balance between successfully marketing terroir and being done in by it. While the value of regional branding has been well established, it isn't always clear which regional brand images to emphasize and to what degree it is helpful to further delineate the winescape.

Collaborative efforts

Wherever the region and whatever the differentiation emphasized, research has documented the rewards of collaborating *as a region*. In Australia, Coonawarra's efforts have been handsomely rewarded by this wine region's strong brand image.[32] Coonawarra is certainly not alone. The Marlborough wine region in New Zealand has also demonstrated how a wine region can thrive through collaboration in building a regional brand.[4]

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Colin Jardine gives insight into the problems caused by a lack of such successful collaboration by a region's stakeholders. In speaking of the Pyrenees region in Australia, he said, "What's choking us (regionally) at the moment is a lot of individual egos."[18] The Napa solution (see below), in contrast, allowed the individual egos to have their day, alongside the regional identity and of all things, on the same label.

Success achieved by collaboration also spreads through the value chain. The greater the power of a regional brand, the better positioned both growers and wineries are in the global wine marketplace.[29]

The success of the collaborative efforts in the Lodi region in California has completely changed the image of their wines and grapes. The Lodi wine community has avoided the fragmentation that occurs in many other areas. As a result, growers are receiving higher prices for their grapes just as the wineries have raised the perceived value of their wines.

Regional branding in California

The system of *Appellation Contrôlée (AOC)* has been successful in France and the establishment of American Viticultural Areas (AVAs) was meant to imitate it.[28] Growers and producers in the U.S. have therefore been eager to create their own appellations. Many draw on European metaphors in their marketing and many have proposed quite specific AVAs. More than 190 viticultural areas have been established in the U.S. by the TTB, and most of them are in California.[34]

When American consumers trade up in their wine spending, they typically begin to pay attention to appellation labelling. Yet Jack Cakebread (Cakebread Cellars, Rutherford, CA) suggests that the trend toward more AVAs adds to the mystique of wine that keeps so many from becoming wine drinkers in the first place.[11]

The question for the industry is whether the ongoing proliferation of regions helps sell wine. The TTB indicates that the commercial advantage a winery receives through a viticultural area does not come from its regulatory recognition as much as from its use. Consumer acceptance rather than legal recognition determines the true value of a viticultural area.[21]

Across the world, similar reservations have been expressed. The regional name Margaret River in Australia has attained value in its own right and is too great an asset to dilute without compelling reason. It is not clear whether or not it would be desirable to delineate official sub-regions.[15]

C. Metinko notes the financial stakes, noting that appellations have become a driving force in the marketing and labelling of wine.[24] The name of an appellation can therefore mean

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None have recognized this more than the French. Their classification system has ensured premium prices for the favored vineyards.[16] Yet it has not ensured premium prices for everyone, nor for every wine product. Being a producer in an appellation and having that regional name available does not of itself ensure financial success.

In the Napa example, some saw "the valley" as a kind of market basket, with pockets in unrelated stretches of the county. It was decreed that any geological crease was officially Napa Valley and any grapes coming from those environs to be Napa Valley fruit, regardless of how undistinguished. This enabled growers to receive higher prices for their grapes, and those making wine from them to charge more.[9]

However, there has to be real value in the wine associated with a region and there has to be recognition of that in the marketplace. Sometimes AVAs have neither.

Richard Mendelson, an alcohol beverage attorney in Napa, states, "If you create an appellation and give the consumer nothing in terms of definition of character or quality, then the appellation doesn't have the sort of added value that some of the other areas develop."[22]

Sara Schorske notes the broken nature of the AVA system today and the chorus of industry complaints.[26] Many feel that there are too many AVAs and that they are confusing to consumers. "If asked, many people will name 'Mondavi' as a California AVA," notes Schorske.

As *Decanter*'s New York correspondent Howard G. Goldberg trenchantly observes, "There is scant evidence that the general public cares one whit."[20]

Some places, on the other end of the effectiveness spectrum, are not recognizable even after years of marketing effort. Guenoc Winery (Lake County), recently redesigned its brand identity and packaging, repositioning the winery to focus on Lake County and a second California tier. Yet this winery years ago successfully petitioned to establish, and extensively used in its marketing, the monopoly AVA Guenoc Valley.[33]

Often the impetus for creating new AVAs comes not from the wineries, but rather from growers. The impact of AVA lines on growers cannot be ignored, as a distinct appellation assures growers in acclaimed growing regions of receiving higher prices for their fruit.[8]

This is true for AVAs that make it into the realm of being recognized. Not all do. A further drawback to the ever-increasing number of small AVAs is that once they are successfully established, they create the appearance of a tiered system of place names that plays into the French model of hierarchy.

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During the debate over the creation of the Rutherford and Oakville AVAs in Napa Valley, the concern of opponents to the new AVAs was that the new regional names would form such an officially-sanctioned hierarchy.[7]

Brand Napa

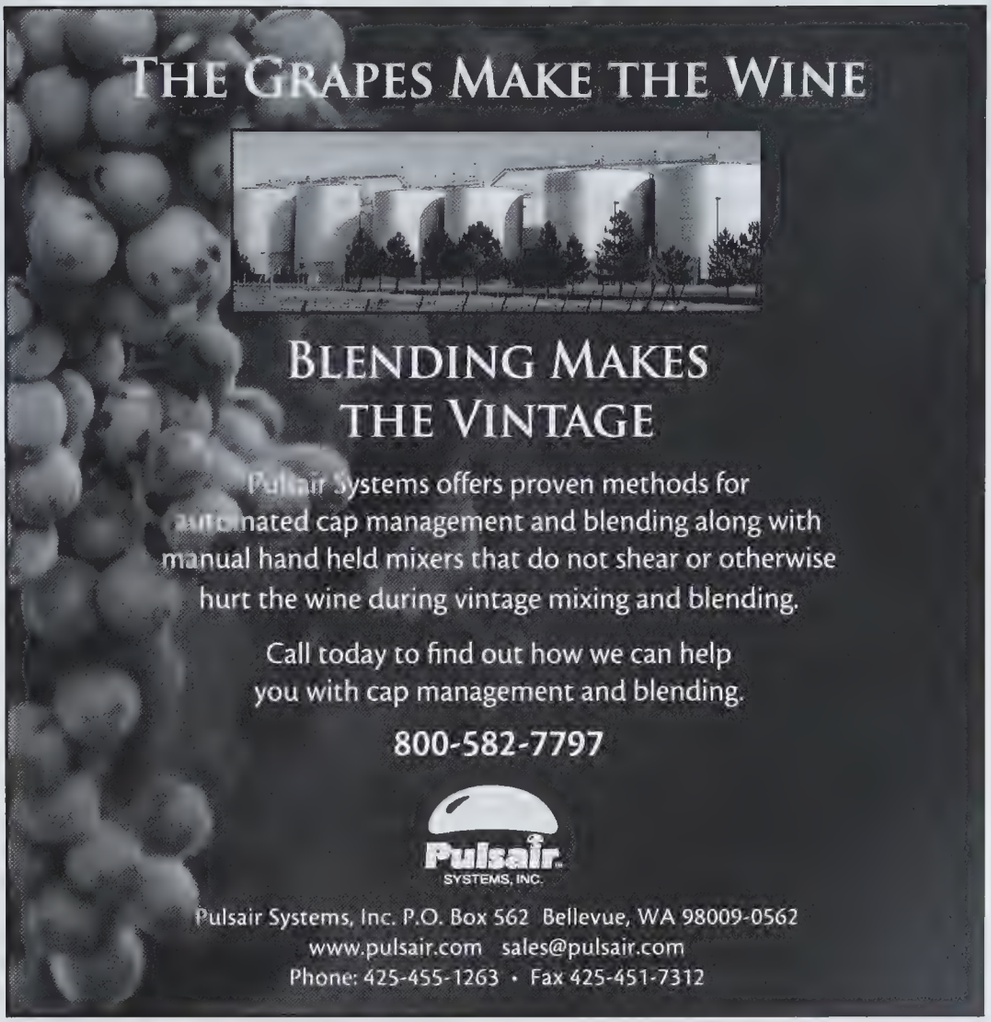
Though the most recognized name in American wine regions, Napa Valley accounts for only 4% of the production of California's wines, a statistic that is often an "ah-ha" moment for even the most seasoned wine lovers. But the appellation has an economic impact on the American economy of nearly $40 billion, which is about 1/3 of the wine industry's impact statewide.

The name Napa brings to mind a vision of world-class picturesque wineries and vineyards and quaint towns that dot the valley, which is less than 40 miles from the San Pablo Bay to Mt. St. Helena. Napa County is the last county in the San Francisco Bay Area that counts agriculture as its primary industry, and insightful vintners and growers created the first agricultural preserve in the U.S. in 1968 to protect the region.

Today, more than 38,000 acres are protected on the valley floor. Mountainous regions to the east and west are largely protected by even more stringent land use regulations. In 1990, Napa County residents enacted the Winery Definition Ordinance to keep winemaking and agriculture the primary focus of the wine industry, so contrary to popular misinformation, there are no restaurants, hotels, or spas at the region's wineries (except for the restaurant at Domaine Chandon).

The Napa Valley AVA, recognized in 1981, was the first in California. Within a few years the nesting appellations within the Napa Valley AVA were being recognized also. Vintners and growers wisely chose to market the Napa Valley first and individual brands second, which has been the successful model ever since.

In 1989, the industry in Napa Valley requested that a California state law be written reinforcing this notion with conjunctive labelling, whereby if a winery chooses to use a nested appel-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lation within Napa Valley on the label such as Oakville or Rutherford, the words "Napa Valley" need to appear in very close proximity. This law has been another of the foundations of successful "brand Napa" marketing that provides a unifying voice and maintains the integrity of the greater, more inclusive appellation.

Napa Valley vintners and growers work hand-in-glove and the camaraderie within the region's wine community is often found to be surprising by visiting winemakers, wine trade representatives, and journalists.

Finding a group of Napa vintners pouring their wares shoulder-to-shoulder on market visits around the country and around the world is the norm from Napa Valley, and the exception in the greater industry. This cooperative spirit spreads to information sharing on winemaking, agricultural practices, and innovation and is what defines the leadership role of Napa Valley vintners and growers and the overall appellation in the wine industry.

Brand Sonoma

Since the creation of the first AVA in 1982, there have been 13 legally approved (though not always recognized) AVAs in Sonoma County. Today when a winery labels its product as coming from Rockpile, most consumers scratch their heads and ask, "Where is that?"

Years ago most wineries also put Sonoma County on their labels, but now it is much more common to label only with the smaller appellation.[29] Sonoma wineries, as most in California, are not about to revert to labelling their wines with the county designation only when they are entitled to use an AVA. There's no traction here.

But what is evolving is a greater understanding of Napa's success. A positively viewed region can provide a halo effect to the smaller appellations contained within, and play a vital role in the regional wine-branding effort.

There is still a reticence about promoting a larger regional name when there are smaller appellations that need promoting closer to home. Often the stakeholders in a region are at cross purposes even when no ill will is intended. They hinder each other by not working as one. T. Keys sees the lack of including the regional name "Pyrenees" as the problem with that region in Australia.[18] There are local vignerons who do not carry the regional name on the label.

Napa Valley has been written about and researched extensively. Yet its neighboring region in close proximity to the west, Sonoma County, has had much less attention. As of early 2006, only one study had ever been done on the branding of Sonoma County grapes and wine.[14] The Newman-Stein-Friedman study was commissioned by

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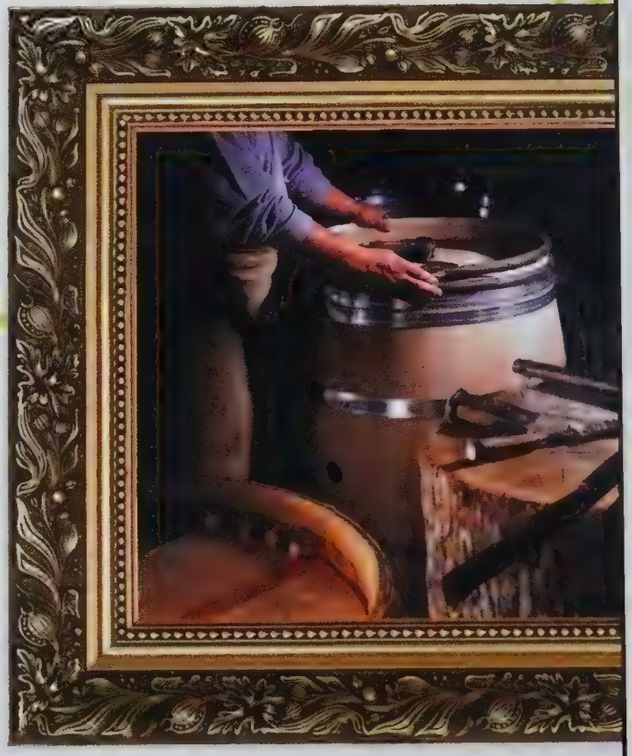

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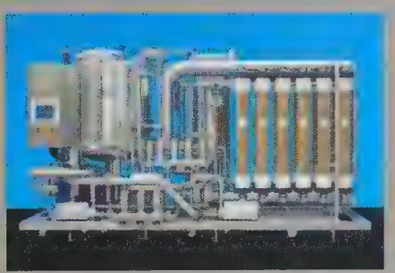

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and prepared for the then Sonoma County Grape Growers Association (SCGGA) in 2004.

In the report, the following awareness of wine regions was found among wine consumers purchasing wine at least once each week:

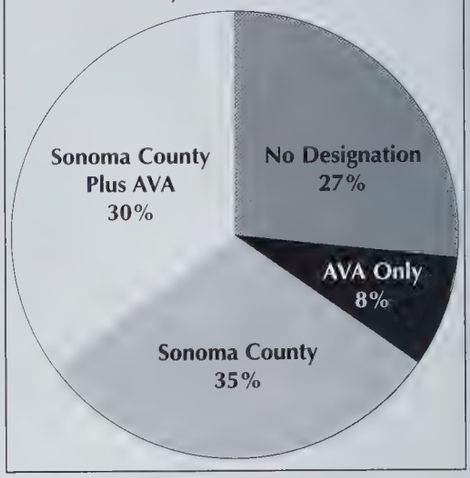
The awareness of the appellations within Sonoma (Dry Creek Valley and Russian River Valley) rated at far lower levels than the larger region into which they fall. The study demonstrated that labels with an appellation or AVA only, like Russian River Valley, without reference to Sonoma County, scored at lower levels of awareness and preference.

Yet somewhat illogically, the trend in the local industry's labelling, as described above, has been toward specific appellations and away from regional identity. This study further demonstrated the value of Sonoma County as a stand-alone brand on labels presented to consumers, with awareness approaching that of Napa.[25]

The 2004 Newman-Stein-Friedman study demonstrated the underutilized value of brand Sonoma in connection with the marketing of Sonoma wines. It did an excellent job of establishing the value of Sonoma compared to other famous wine place names such as Napa.

The study also demonstrated how much more aware consumers are of the brand Sonoma than they are of the AVAs within its borders. The survey established a strong correlation between greater quality expectation and the inclusion of Sonoma County on wine labels. It also assessed these expectations with three alternative wordings:
1. Does the conjoining of Sonoma County and a specific AVA raise the expectation of better tasting wine?
2. Does the conjoining of Sonoma County and a specific AVA raise the expectation of better quality grapes?
3. Does the conjoining of Sonoma County and a specific AVA raise the expectation of purchasing intent?

Figure I: Newman-Stein-Friedman Study (2004) Results



In all three cases, the Newman-Stein-Friedman study demonstrated no statistically significant difference in the results by rephrasing the question, so that using the regional name Sonoma raises the result far above simply using the AVA alone.

In that study and its intra-Sonoma component, consumers were presented with four label formats (see page 70):
1. undesignated, simply varietal
2. with Sonoma County added
3. with AVA added and no Sonoma County
4. with both the AVA and Sonoma County added

Figure I shows that approximately one-third of consumers preferred label #2, approximately one-third preferred label #4, and only 8% preferred label #3. In essence, two-thirds of the respondents preferred some involvement of Sonoma on the label.

Labelling wines without a noteworthy geographical reference as in label #1 is a non-starter with most ultra-premium and icon-positioned wine brands. In non-commodity wine, some geography must be mentioned. Any wine that qualifies for something more particular than California or North Coast will display it on the label, such as a county name like Sonoma, or a further degree of differentiation with an AVA.

Label #2 is also a non-starter with much of the over $15 wine from most California counties. For much of the wine trade, there is the legitimate fear of creating a "lower quality percep-

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tion" and thus lower price expectation with a county designation only.

Most of the wine community in California has embraced the French way of thinking. In Burgundy, for example, a given producer works on a price-quality range from AC Bourgogne being cheapest to Village appellations and finally small Grand Cru place names as best and most expensive. For the ultra-premium and icon producers, the two most viable alternatives to query are labels #3 and #4, and variations on those, involving other regions and their corresponding AVAs — this time by themselves, with no other choices available.

Nick Frey (President of Sonoma County Winegrape Commission), thinks the fatal flaw is that wine marketers feel the choice is either Sonoma County or the AVA when in fact using the AVA and Sonoma County provides useful information to the consumer.

AVA recognition is low, in general, and as AVAs proliferate, Frey feels it is important to link AVA to the better known region. Thus, Russian River Valley, and especially Rockpile or Bennett Valley, followed by Sonoma County (or even Sonoma County, California) builds awareness that the AVA is within the well-known Sonoma County.

Wine Opinions conducted additional consumer research in 2007 with core wine consumers: 84% of respondents consume wine one or more times per week. In unaided awareness, consumers were asked to name five California wine regions. The national panel of 620 involved wine consumers named only three regions on average, and the most named regions were Napa and Sonoma at 86% and 77%, respectively, followed by Russian River Valley at 28%.

When core wine consumers were asked if they agreed that "in general, the more specific the region, the better the wine," 59% agreed. This highlights the wine marketer's dilemma.

The more specific AVA designation has greater perceived quality, and other research suggests the consumer expects to pay higher prices for those wines. Yet consumers are much less aware of the AVA than they are of Sonoma County.

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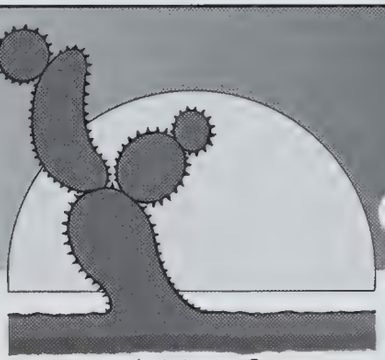

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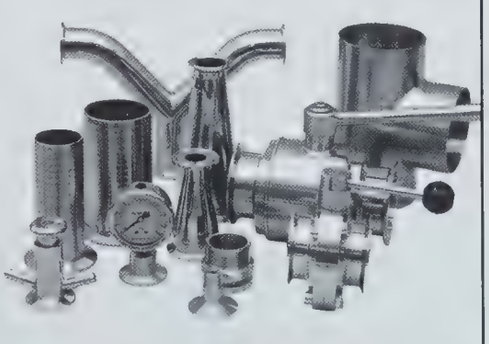

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Newman-Stein-Friedman Study (2004) Label Choices

Are wineries seeking new consumers who might trade up in their wine purchase, or are wineries only targeting those high-end consumers who have greater regional awareness? At the high end, consumers who frequently buy wines over $20 per bottle , were more likely to choose a wine with only the AVA designation. Those high-end consumers make up just 10% of wine consumers nationally.

For the total survey population when asked to select among three wines at the same price ($15 to $30 per bottle) but from different wine regions, wine consumers tended to prefer wines that included Russian River Valley and Sonoma County relative to those from the other regions, such as Napa Valley. Frey thinks, for most wineries, conjoined labelling that includes the AVA and Sonoma County builds greater awareness for both the AVA and Sonoma County.

The Sonoma County Winegrape Commission created a program to recognize those wineries that include Sonoma County on at least 95% of wines sold along with AVA and vineyard designations. There were 37 Sonoma County Star Wineries recognized in 2008. There are more than 350 bonded wineries in Sonoma County and even more wine brands.

"We hope that this recognition program will encourage more wineries to include Sonoma County on all of their wines produced from Sonoma County grapes along with AVA or vineyard designations," says Frey. "That simple change will help build brand Sonoma and the 13 AVA brands within our county."

Summary/Recommendations

This paper highlights different perspectives of the relationship between regional brands and their corresponding American Viticultural Areas (AVAs). The answers gained in the process could provide grape growers and winery owners with a greater understanding of the strength of their own regional brands.

While the importance of regional wine brands, characterized as U.S. counties, has been confirmed, the true value of those brands has not been acknowledged by many of the grape growers and wineries that have invested energy and money to brand the smaller appellations where their businesses operate.

The proliferation of AVAs and the diluting effect on regional brands is an issue that is currently being discussed, but beyond the area of this study. It

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appears that most AVAs have very weak regional brand strength when compared with that of their corresponding counties. It is therefore recommended that wineries, and in particular wineries using less well-known AVAs, begin utilizing the brand power of the larger regions available to them when those regions have a positive brand image.

More research on a national level must be done. More AVAs are currently being proposed and few wineries today are labeling with any mention of the county of origin. There are certainly other areas where the advantage of the larger wine region is being ignored while embracing small, very local AVAs.

The industry bias toward marketing unknown appellations could therefore be enhanced by reference to strong, value-laden regional images. It is important that the nature and strength of these regional brand images be determined as a starting point in this process. ■

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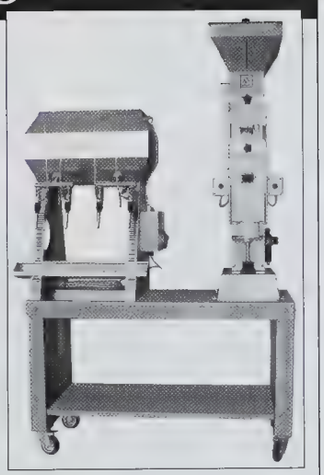

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New tool to describe oral sensations elicited by white wine

BY Gary J. Pickering,
Cool Climate Oenology and Viticulture Institute, Department of Biological Sciences, and Department of Psychology, Brock University (St. Catharines, Ontario, Canada)
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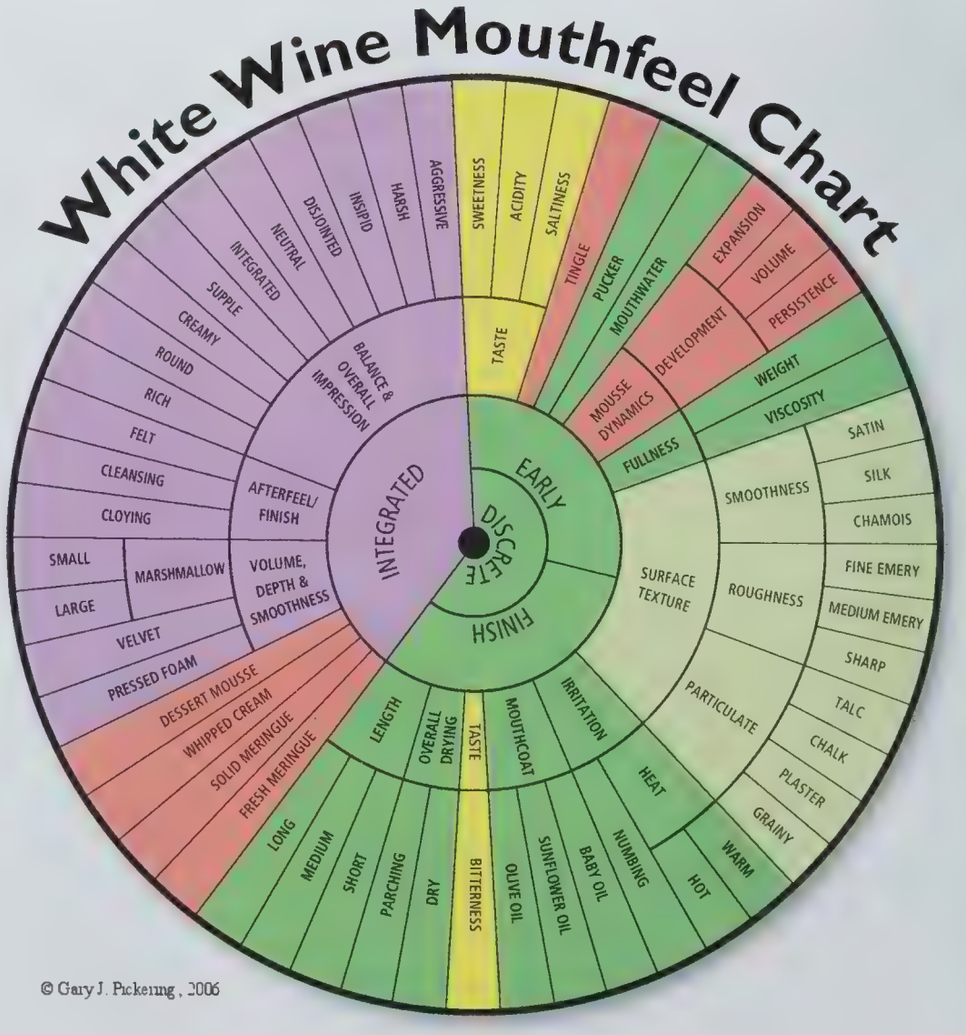
White wines can elicit a wide range of taste and mouthfeel sensations, some of which may be qualitatively different to those elicited by red wine. Through extensive sensory panel work involving 136 wines and 21 sessions, a lexicon, set of definitions, evaluation protocol, and reference standards have been developed to describe and measure the oral sensations elicited by white wine, including table, sparkling, dessert, dealcoholized, and fortified styles.

The lexicon is presented as a hierarchical wheel structure. These tools can be used to more fully define the influence of viticultural and enological variables on white wine quality and to aid in the training of and communication between wine professionals. The results of one such application of the mouthfeel wheel are summarized where lactic acid bacteria strains were shown to influence the texture of Chardonnay wines in different ways.

Wine is renowned for the variety and complexity of sensations that it elicits. It is a visual (hue, intensity, and clarity), olfactory (ortho- and retronasal aroma), taste (sourness, sweetness, bitterness, saltiness), and tactile stimulant. In the tactile "domain" there are a range of qualities of relevance to wine, with perhaps "mouthfeel" being the best understood.

Mouthfeel refers to the group of sensations characterized by a tactile response in the mouth, for which polyphenolic compounds (tannins) are the main elicitors in red wine. Mouthfeel is widely recognized as an important quality indicator for red wine and may be an important component of overall consumer appeal.[9] However, mouthfeel has not been well studied, possibly due to the absence of a commonly accepted definition and difficulties in measuring the typically subtle sensations it encompasses.

R. Gawel *et al.* have developed a red wine "mouthfeel wheel" (RWMW) — a hierarchical lexicon designed to assist in identifying and classifying these complex oral sensations.[12] In addition, these authors identified reference stan-



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dards that may be used for training judges to describe and measure individual mouthfeel attributes.

These standards are often fabrics, papers, and other materials, assessed manually, that represent the oral equivalent of the sensation. As an aid to descriptive analysis panels, the RWMW has helped with measuring the impact of processing and compositional variables on the subtle mouthfeel characteristics elicited by actual and model red wines.[5,6,7,11,14,29,30,31]

White wine can elicit the basic tastes of sourness, sweetness, bitterness, and saltiness. In addition, a number of components have been shown to impart mouthfeel sensations, particularly those associated with "fullness," including glycerol, sugar, and ethanol.[18,21]

Ethanol (alcohol), as well as contributing to sweetness[1] and bitterness,[17] can also elicit tactile sensations, specifically heat/irritation[13] and astringent-like drying.[4,29]

Organic acids can elicit astringent-like sensations[25,27] and polysaccharides mediate the perception of astringency intensity.[31]

Polyphenolic constituents of white wine also elicit astringent sensations, although their concentration is significantly lower than in red wine.

Additionally, hydroxycinnamates, rather than flavonoids, make up the dominant species, and significant cultivar differences are found.[15]

Thus, white wines also elicit a wide range of taste and mouthfeel sensations, some of which may be qualitatively different from those experienced in red wine. In addition, oral sensations such as astringency are clearly dynamic,[24] changing in intensity and perhaps quality while the wine is being evaluated. This time "dimension" for oral sensations is not incorporated in the RWMW.

These considerations were the catalyst for the current study, which seeks to develop an appropriate and comprehensive vocabulary, system of classification, and set of reference standards for the oral sensations elicited by white wine. This should help in developing a common understanding among wine tasters and winemakers of terms describing mouthfeel and other oral

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Table I: Wines used in development of lexicon

Vintage	Producer/Brand	Variety/Designation	Style	Region and Country
2001	Pierre Sparr	Gewurztraminer	TW	Alsace, France
2000	Bleasdale Vineyards	Langhorne Creek Chardonnay	TW	Australia
2001	Kroemer Estate Wines	Outback Unwooded Chardonnay	TW	Australia
2001	Wyndham Estate	Bin 777 Semillon	TW	Australia
1999	Weingut Undhof-Salomon	Riesling	TW	Austria
2000	Weingut Stadt Krems	Cremisia Grüner Veltliner	TW	Austria
1999	Peter Lehmann	Semillon	TW	Barossa, Australia
2001	Mission Hill	Pinot Blanc	TW	BC, Canada
1999	Mestre-Michelot	Meursault 'Sous la velle'	TW	Burgundy, France
1999	La Chablisienne	Chablis	TW	Burgundy, France
1998	Gloria Ferrer	Chardonnay	TW	California, USA
2001	Greg Norman Estate	Chardonnay	TW	California, USA
2000	Vina Santa Laura	Laura Hartwig Chardonnay	TW	Chile
2001	Viña Errazuriz S.A.	Sauvignon Blanc	TW	Chile
1997	Chateau La Jalgue	Entre Deux Mers	TW	France
1998	Domaine du Viking	Vouvray	TW	France
1999	Vignobles Brisebarre	Vouvray	TW	France
1999	Maison Riviere Fils	Ch. Larmevaille Entre Deux Mers	TW	France
2000	Baron Philippe de Rothschild	Mouton Cadet	TW	France
2001	E. Guigal	Cotes Du Rhone	TW	France
NV	Piat Pere et Fils	Le Piat D'Or	TW	France
1998	Weingut Gunderloch	Riverside Riesling	TW	Germany
1999	Weingut St. Urbans-Hof	Riesling Spätlese	TW	Germany
NV	H. Sichel Sohne	Blue Nun	TW	Germany
2001	Casa Vin. Fazi-Battag. Titulu	Verdicchio	TW	Italy
2002	Corbans Exports Inter.	Stoneleigh Malborough	TW	Marlborough, NZ
2002	Seifried Estate	Sauvignon Blanc	TW	Nelson, NZ
1989	Hillebrand Estates Winery	Chardonnay	TW	Ontario, Canada
1989	Cave Spring Cellars	Chardonnay	TW	Ontario, Canada
1989	Colio Estate Vineyards	Pinot Blanc	TW	Ontario, Canada
1990	Inniskillin Wines	Chardonnay	TW	Ontario, Canada
1995	Thirty Bench Wines	Chardonnay	TW	Ontario, Canada
1996	Reif Winery	Riesling	TW	Ontario, Canada
1999	Strewn Inc	Barrel-aged Chardonnay	TW	Ontario, Canada
2000	Hillebrand Estates Winery	Trius Chardonnay	TW	Ontario, Canada
2000	Chateau Des Charmes	Aligote	TW	Ontario, Canada
2001	Eastdell Estates	Unoaked Chardonnay	TW	Ontario, Canada
2001	Cave Spring Cellars	Auxerrois	TW	Ontario, Canada
2001	Henry Of Pelham	Riesling	TW	Ontario, Canada
2002	Brock University Winery	Chardonnay — Style 1[NC]	TW	Ontario, Canada
2002	Brock University Winery	Chardonnay — Style 2[NC]	TW	Ontario, Canada
2002	Brock University Winery	Chardonnay — Style 3[NC]	TW	Ontario, Canada
2002	Brock University Winery	Chardonnay — Style 4[NC]	TW	Ontario, Canada
2002	Brock University Winery	Chardonnay — Style 5[NC]	TW	Ontario, Canada
2002	Brock University Winery	Chardonnay — Style 6[NC]	TW	Ontario, Canada
NV	C. Alianca Vini. De Sangalhos	Vinho Verde	TW	Portugal
2000	Chateau St. Jean	Sonoma Co. Chardonnay	TW	Sonoma, USA
2002	KWV	Chenin Blanc	TW	South Africa
2002	Vergelegen	Sauvignon Blanc	TW	South Africa
2001	Bodegas Muga S.A.	Rioja	TW	Spain
2001	Santa Margherita	Pinot Grigio	TW	Valdadige, Italy
2000	Seaview Winery	Brut	SW	Australia
NV	Candandaigua Winery	Cribari Extra Dry	SW	California, USA
NV	Andres Wines	Charmat	SW	Canada
NV	Vincor International	Spumante Bambino	SW	Canada
NV	Montaudon	Brut	SW	Champagne, France
NV	Mumm	Carte Classique	SW	Champagne, France
NV	Henkell	Brut	SW	Germany
2001	NR	Moscato D'Asti	SW	Italy
NV	Martini and Rossi	Asti	SW	Italy
1999	Vineland Estate Wines	Riesling Méthod Cuve Close	SW	Ontario, Canada
NV	Hillebrand Estates Winery	Trius Brut	SW	Ontario, Canada
2000	Groblansheimer Killanskberg	NR	NR	NR
2001	Dopff au Moulin	Tokay Pinot Gris Reserve	LH	Alsace, France
1999	Chateau Sahuc Les Tour	Sauternes	LH	Bordeaux, France
1997	S.A.R.L. Vignobles Jestin	Ch. Vari Res. Du Ch. Monbazillac	LH	France
1990	Chateau des Charmes	Late Harvest Riesling	LH	Ontario, Canada
1997	Reif Winery	Gewurztraminer	LH	Ontario, Canada
2002	Brock University Winery	Chardonnay low-alcohol wine[NC]	LA	Ontario, Canada
2000	Mission Hill Reserve	Chardonnay Icewine	IW	BC, Canada
1996	Jackson-Triggs	Vidal Icewine	IW	Ontario, Canada
1999	Brock University Winery	Vidal/Riesling ice wine[NC]	IW	Ontario, Canada
2000	Hillebrand Estates Trius	Vidal Icewine	IW	Ontario, Canada
NV	White Port	NR	FW	Portugal
NV	Gonzalez Byass and Co.	Tio Pepe Fino	FW	Spain
NV	Fernado de Castilla	Amontillado	FW	Spain
NV	Bodega Hidalgo La Gitana	Manzanilla	FW	Spain
2002	Brock University Winery	Chardonnay de-alcoholised wine[NC]	DW	Ontario, Canada

NV: non-vintage; NR: not recorded; TW: table wine; LH: late-harvest/dessert wine; IW: ice wine; FW: fortified wine; SP: sparkling wine; DA: dealcoholised wine (ethanol content ca. 0.5 % v/v); LA: low alcohol wine (ethanol content ca. 6 % v/v); NC: not commercially available; BC: British Columbia; NZ: New Zealand

sensations and aid in the communication of those descriptors.

Such a tool may also assist the research community by facilitating a more comprehensive and systematic evaluation of the effects of viticultural and enological treatments on the mouthfeel and related sensations elicited by white wine.

Materials and methods

The sensory panel consisted of 11 individuals (eight females and three males, between the ages of 24 and 60). All were experienced wine tasters, including wine industry professionals (two winemakers, one sommelier, and one wine writer) and senior staff and students from Brock University's Cool Climate Oenology and Viticulture Institute (CCOVI) and were recruited

based on their experience, interest, and availability.

Development of the white wine mouthfeel wheel occurred over 21 one-hour sessions in a panel discussion room and sensory evaluation lab at CCOVI. For all sessions, water and fresh bread were provided to cleanse the palate between wine samples, and nose clips were used to assist the panel in focusing on oral sensations and to remove the influence of olfactory cues.

Wines were presented in ISO tasting glasses and at serving temperatures appropriate for their style, ranging from approximately 7° to 16°C. In the first 11 sessions, the panel evaluated 77 white wines (Table I). These were representative of both Old and New World wine-producing nations (12) and styles, and further selected to represent as wide a range of oral sensations and vintages (11) as possible.

Examples included table (51), sparking (11), dessert (9), fortified (4), and reduced-alcohol (2) wine styles. Sparkling wines included samples produced using *méthode classique, méthode champenoise, méthode cuvée close,* charmat method, natural fermentation, and Asti techniques.

During the first session, introductory exercises were conducted using eight aqueous solutions representing common oral sensations, to assist the panel in distinguishing between taste and tactile sensations. Attributes and solutions used were: carbon dioxide (mineral water), sweet (10g/l sucrose), acid (2.5g/l tartaric acid), hot (15% v/v ethanol), astringent 1 (2g/l alum sulphate), astringent 2 (1g/l grape seed tannin), viscous (2g/l carboxymethyl cellulose), and bitter (0.1g/l quinine sulphate).

In the first 11 sessions, descriptive analysis and focus group techniques were used to generate appropriate descriptive terms to describe the oral sensations elicited by the wines. Between five to eight samples from Table I were presented at any one session, with wines of similar style presented together according to the following general groupings: Chardonnay, sparkling, late harvest and sweet, high acid, other table wines, low alcohol, and fortified.

Panel members were instructed to take each wine into the mouth, swirl it from side to side, and expectorate. After expectoration, they were asked to move their tongue around their palate, and complete the process of generating as many descriptors as they felt appropriate to describe the oral sensations experienced.

The RWMW was provided to the panel as a guide for possible descriptors.[12] After each wine, the panel discussed their experiences and assisted in the process of organizing and rationalizing the developing lexicon.

After all wines had been evaluated once, candidate descriptors for the final lexicon were limited to those used more than four times and by more then one panelist across all samples presented. In response to a panel member's request, the descriptor generation sheet was divided into six sections to capture information on how the sensations changed with time. Specifically, "initial" (0 to 3 seconds after ingestion), "in mouth" (3 to 18 seconds), "at expectoration" (18 to 23 seconds), "finish — early", "finish — mid," and "finish — late."

A sub-set of 35 representative wines was presented over seven sessions to assist in fine-tuning the developing lexicon, definition sheet, and reference standards. After extensive panel discussion, the descriptive terms were categorized into sensations that could be conceptualized as having one clear intensity component and those that were an amalgam of more than one sensation or concept.

These attributes were sub-categorized according to the type of sensation (such as taste or surface texture) and the time at which they reached their peak intensity, and then represented in a hierarchical wheel structure after R. Gawel et al's mouthfeel wheel.[12] To aid

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in the utility of the lexicon and wheel, the original six time-categories were reduced to two (early and finish) by panel consensus.

In developing the lexicon, oral and manual reference standards were developed, refined, and used extensively by the panel to represent the sensations and their perceived intensity and to minimize ambiguity in the use of descriptors. For terms where physical standards could not be developed, conceptual definitions were derived by panel consensus.

In the last four sessions, 24 representative wines were presented to the trained panel to assess the utility and discriminatory properties of the wheel, and to make minor adjustments to definitions, standards, and evaluation methods. Intensity scales were employed for discrete descriptors, while presence/absence ratings were used for integrated descriptive terms.

Results

Figure I shows the final lexicon, visualized as a hierarchical, segmented wheel. The wheel is divided into *discrete* sensations (n = 33) and those that are *integrated* percepts (n = 21), consisting of more than one sensation or concept. Further ordering of the tiers is based on groupings of increasingly similar attributes, similar to the structuring used by R. Gawel *et al.*[12]

Outer-tier terms are the specific oral qualities that are used to score and describe white wine. Segments are color-coded to facilitate ease of use by grouping attributes together that belong to the same oral quality/dimension or that are elicited by the same wine style.

Attributes that were predominantly elicited by sparkling wines are color-coded salmon, and taste qualities are coded yellow. Non-taste sensations are color-coded deep green, while those that pertain to surface texture attributes are coded light green. Integrated qualities, other than those elicited by sparkling wines, are color-coded purple.

Table II lists outer-tier terms derived by the panel to describe discrete sensations, along with their definition, intensity terms, and the type of reference standard used. Table III gives the composition of the oral and manual reference standards for discrete sensations and a description of how they are used or evaluated. Table IV shows the same information for integrated sensations. Figure II provides representative examples of the scales derived for quantifying discrete oral sensations elicited by white wine.

Discussion

In development of the RWMW, sorting tasks by the panel and subsequent cluster analysis were used to assist in the categorization of astringency terms. This approach was not used in

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Table II: Definition, intensity terms, and reference standard used for outer-tier descriptors of discrete sensations

Outer-tier descriptors	Definition	Intensity terms / levels and scale anchor terms	Standard type
Sweetness	—	Low, medium, high	Oral
Acidity	Sourness	Levels 1–4	Oral
Saltiness	—	Low to moderate	—
Tingle	Sense of irritation usually associated with carbonation	Low to high	Oral
Pucker	Reflex action of mouth surfaces being brought together and released in an attempt to lubricate mouth surfaces[1]	Low to high	Conceptual (see definition)
Mouth-water	Reflex reaction characterized by excess production of saliva	Low to high	Conceptual (see definition)
Expansion	Rate of mousse evolution and de-evolution in the mouth	Evolution: slow to fast De-evolution: slow to fast	Conceptual (see definition)
Volume	Sense of fullness created by mousse in the mouth	Low to high	Conceptual (see definition)
Persistence	How long mousse is retained in the mouth	Short to long	Conceptual (see definition)
Weight	Sensation of 'body' when the wine is stationary in the mouth	Light to heavy	Oral
Viscosity	Varying degrees of viscosity from thin to thick	Thin to thick	Oral
Warm and hot	Differing intensity of heat sensation	Warm to hot	Oral
Silk, satin, and chamois	Surface texture of varying degrees of softness/smoothness	Low/light (satin) Moderate (silk) High/heavy (chamois)	Manual
Fine emery, medium emery, and sharp	Increasing degree of roughness in surface texture	Low (fine emery) Moderate (medium emery) High (sharp)	Manual
Talc, chalky, plaster, and grainy	Particulate sensations ranging from fine to coarse particles	Fine (talc) to coarse (grainy)	Manual
Numbing	Loss of sensation in the mouth	Low, moderate, and high	Conceptual (see definition)
Baby oil, sunflower oil, and olive oil	Mouth-coat sensation	Light (baby oil) Moderate (sunflower oil) Heavy (olive oil)	Manual
Bitterness	—	Low, moderate and high	Oral
Dry and parching	Overall drying sensation as experienced by loss of moisture in the mouth. Parching refers to the excess removal of moisture from the mouth.	Low, medium, high, parching	Oral
Short, medium, and long	Persistence of any oral sensation	Short, medium and long	Conceptual (see definition)

[1] From Gawel *et al.* (2001)

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our study, assuming that the validity of the groupings developed by R. Gawel *et al.* would hold for white wine.[12]

There was extensive use of focus-group techniques where the experienced panel played a dominant role in the development and refinement of the terminology, the categorization of the descriptors, and the development of reference standards.

There is significant overlap between the white and red wine mouthfeel wheel lexicons, definitions, and grouping of sensations, which is to be expected given that the RWMW was used as a "starting point" in this study. However some significant differences are apparent and discussed below.

The clear division of the wheel into discrete and integrated sensations partially addresses concerns with the RWMW that some terms are compound in nature and/or contain a hedonic component, and perhaps confound a common understanding of some attributes. However, the lexicon is not free from this potential criticism, and further work is required to establish the reliability and descriptive value of the integrated descriptors.

Fresh meringue, solid meringue, whipped cream, and dessert mousse, for instance, may seem unusual terms to describe wine. The panel felt strongly that these products, when assessed orally, elicited very similar sensations to many sparkling wines with respect to the impression of fullness and the dynamic feeling of expansion. Their actual utility in assisting with describing and discriminating sparkling wine remains to be determined.

The RWMW contains descriptors that normally carry flavor connotations (retro-nasal odor — such as pepper, chili, resinous), even though they are defined without reference to olfaction, and a "slice" of the wheel is dedicated solely to flavor attributes (lift, activity, and concentration). We attempted to avoid descriptors related to flavor in order to simplify the task of the assessor(s) and develop a lexicon as focused and unambiguous as possible.

The ecological validity of using nose clips should be further investigated. For instance, how well do terms generated in the absence of olfactory cues describe the oral sensations experienced under normal wine evaluation conditions, and particularly the absence of nose clips?

Numerous interactions between aroma, taste, and tactile sensations have been documented in the literature. For instance, taste may enhance aroma intensity[16] or suppress it.[32] Conversely, aroma may enhance[8] or suppress[28] taste intensity.

Mediating factors in the direction and extent of these interactions include prior association with the particular flavor-taste combination[28] and whether a "gestalt" or analytical paradigm is used in assessing the stimulant combinations.[22] Irritants have also been shown to interact with both taste and smell perception, for instance suppressing sweetness[23] and some odors.[2]

Recently, studies have confirmed that tactile stimuli can also modify taste and aroma perception.[3] While the role of texture in controlling flavor release and thus aroma and taste intensities is significant and well documented,[33] there is evidence that a perceptual integration of these modalities may also be involved.[34]

Much of the research investigating textural/tactile interactions with other sensory modes has been confined to solid and semi-solid foods/model foods or relatively simple food systems. However, given these previous findings, we speculate that aroma cues will influence perception of some mouthfeel attributes elicited by white wine, and are currently pursuing research to examine this hypothesis.

Descriptors are ordered clockwise on the wheel, starting at "12 noon," according to the approximate order of perception or maximum intensity

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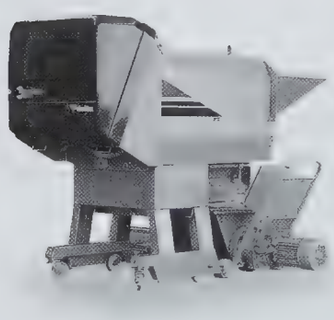

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experienced. This should assist judges in finding and rating terms more expeditiously, particularly important given the large number of descriptors presented here and when assessing complex wines eliciting multiple sensations.

In contrast with the use of the RWMW by R. Gawel *et al.*,[11,12] terms on the outer edge of the white wine wheel generally represent points on the scale for inner-tier sensations. The panel found this organization useful when conceptualizing mouthfeel attributes and in subsequent scoring of wine, as they were already familiar with the line scale anchor terms and qualities to which they related.

Structuring of the wheel into two time components (early and finish) assists in more fully characterizing mouthfeel sensations, particularly given the known changes in intensity during evaluation of wine astringents.[10] The decision to reduce six original time-segments down to two was made primarily for pragmatic reasons, to increase the ease of using the wheel. However, more research is encouraged to fully define how oral sensations elicited by wine change in both quality and intensity over time.

Scales and data analysis

During preliminary trials using this wheel, judges rated discrete sensations using traditional, 15cm visual analog scales anchored with adjectives and, where appropriate, reference standards (Figure II). Data collected in this way can be assessed using powerful parametric statistical techniques such as analysis of variance. Additionally, multivariate methods such as principal components analysis can be applied, which allow for thorough exploration of the data, including defining of relationships between the descriptors themselves.

Integrated terms are best rated as simply present or absent. The data can then be analyzed using a number of non-parametric options. Simply tabulating the frequency of use of each integrated term across the panel can provide valuable information of how wine samples differ for those attributes. Results for both discrete and integrated terms can be graphed using cobweb plots/radar graphs, which can provide an intuitive and clear presentation and description of each wine.

The visual analog scales used for discrete sensations are typically scored by having each judge place a vertical mark on the scale that corresponds to their perception of the intensity or quality of the attribute under consideration. The distance from the origin (left hand anchor mark) to their mark is then measured, and that distance (intensity score) is recorded.

The assessment is made relative to the reference standards and anchor terms, and the location of both on the

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Table III: Composition of oral and manual reference standards and their application for *discrete* sensations

Outer-tier descriptors	Final composition of standards	Evaluation protocol
Sweetness	30 g/L sucrose (Sigma-Aldrich) in water (corresponds to anchor term sweetness at 2.5 cm)	Swirl sample around mouth
Acidity	1,2,3 and 4 g/L of tartaric acid (Fischer™) in aqueous solution (corresponds to "*Levels 1,2,3 and 4*", respectively)	Swirl sample around mouth
Saltiness	*Moderate* = 1.5 g/L NaCl in aqueous solution	Swirl sample around mouth
Tingle	*'Slight'* = Moderately carbonated mineral water (bottle cap partially unscrewed for 24 hrs to release some CO_2) *'Tingle'* = Moderately carbonated mineral water opened immediately prior to serving	Swirl sample around mouth
Weight	a concentration series of 0.5 g/L, (*'light'*), 1 g/L (*'moderate'*) and 2 g/L (*'heavy'*) of carboxymethyl cellulose (Sigma-Aldrich) in aqueous solution	Take equal volume of sample and hold in mouth
Viscosity	a concentration series of 0 g/L (*'thin'*), 0.5 g/L, 1 g/L, 2 g/L, and 3 g/L (*'thick'*) of carboxymethyl cellulose (Sigma-Aldrich) in aqueous solution	Take equal volume of sample and move from side to side in mouth
Warm and hot	*Warm*: 13% v/v ethanol (LCBO, Canada) solution *Hot*: 15% v/v ethanol (LCBO, Canada) solution	Swirl sample around mouth
Silk, satin, and chamois	2 x 3.5 cm strips of silk fabric, satin fabric, and chamois cloth (all Fabricland™, St Catharines)	*Silk:* rub the bottom 'shiny' side of the fabric between your forefinger and thumb moving with the nap; *Satin:* rub with your thumb the shiny 'top' side of the fabric moving with the nap; *Chamois*: rub the smoother side of the cloth between your forefinger and thumb
Fine and medium emery	2 x 3.5 cm strips of fine and medium emery paper (respectively, 600 grit and 220 grit Norton® all purpose sandpaper, Home Dept™, St Catharines)	Hold the emery paper firmly between forefinger and thumb while rubbing the sample back and forth with thumb
Sharp	single sheet of heavily crinkled aluminium foil paper rolled into 3 cm diameter ball	Roll aluminium foil ball between the palms of your hands
Talc, chalky, plaster and grainy	Talc powder: Johnson and Johnson® baby powder Chalk: standard blackboard chalk Plaster: dry gypsum powder Grainy: sand from Vanwagners beach, Hamilton Ontario	Rub each standard between thumb and fingers
Baby oil, sunflower oil and olive oil	Baby oil (*'light'* mouthcoat): Johnson and Johnson® baby oil Sunflower oil (*'moderate'* mouthcoat): Unico® sunflower oil Olive oil (*' heavy'* mouthcoat): Bertoli® extra virgin olive oil	Insert finger in oil and smear between forefinger, middle finger and thumb in a circular motion
Bitterness	0.05g/L of quinine sulphate in aqueous solution = *moderate* bitterness intensity	Swirl sample around mouth
Dry and parching	A concentration series of 0.05 g/L, 0.1 g/L, 0.25 g/L and 0.5 g/L alum sulphate in aqueous solution, representing *low, medium, high,* and *parching* drying sensations, respectively	Swirl sample around mouth

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scale can be altered depending on specific wines under examination.

For example, if a panel is evaluating heavily extracted or acidic wines that might elicit coarser sensations, the chalk standard can replace talc to anchor the left-hand end of the particulate scale (see Figure IIe), thus increasing the range of scale available that is appropriate to wines under consideration. This can increase the likelihood of establishing differences between samples.

In developing the lexicon, the panel rated some descriptors multiple times across different time points. Particular sensations can be measured more than once during an evaluation to fully describe a sample, if needed. For example, in unpublished work from our lab, white wines were evaluated for particulate, roughness, and smoothness both "in mouth" and again "after expectoration," with significant changes noted between these time points for some samples, in agreement with findings on red wine from R. Gawel *et al.*[10]

Applications and other considerations

The white wine mouthfeel wheel should assist with more clear and precise communication between wine professionals on the oral sensations elicited by wine. It should also allow the research community to more fully describe the influence of viticultural and enological variables on wine quality.

For example, it has been used in conjunction with classic flavor-profiling techniques to examine the influence of lactic acid bacteria (LAB) strains on the texture of Chardonnay wine.[20] In that study, the influence of five different LAB strains on the texture of Chardonnay wine as experienced in-mouth and after expectoration was examined, and compared with Chardonnay that had not been through malolactic fermentation (control).

Higher perceived acidity and acid-mediated tactile sensations such as pucker intensity explained most of the differences between control wines and those that had been inoculated with LAB. Wines produced using different LAB strains were differentiated for all three surface texture categories — smoothness, roughness, and particulate. Irritation, drying, and weight were also important in discriminating some strains.

In addition, the change in oral sensations during gustation also appears to be important, and some differences were found between treatments for integrated sensations, particularly volume, depth, smoothness, balance, and overall impression.

In addition to traditional flavor-profiling applications, the lexicon, reference standards, and evaluation protocols may also find a use in consumer

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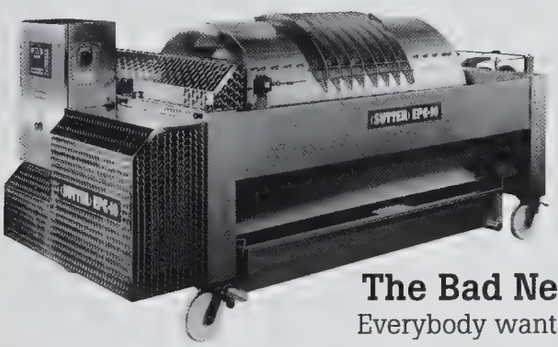
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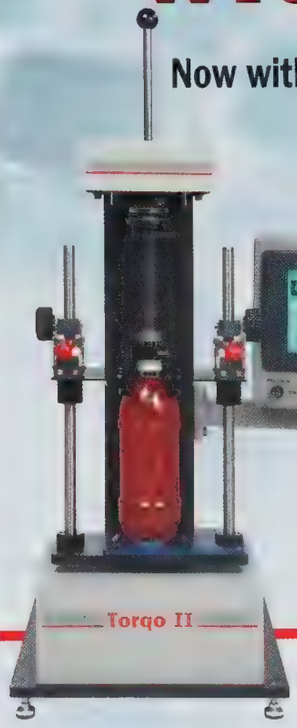

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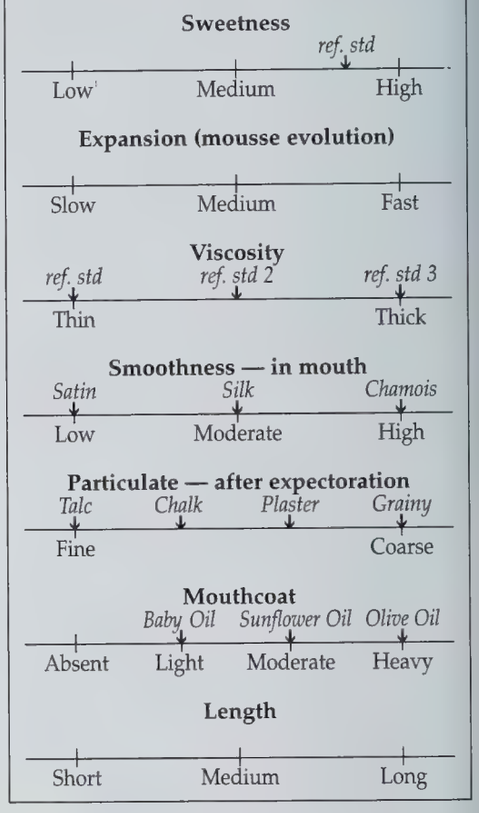
Figure II: Representative scales used for measuring discrete oral sensations elicited by white wine



research, particularly with preference mapping approaches.[26] In preference mapping and related methodologies, data generated from descriptive analysis are "mapped" onto consumer preference scores and demographics to better understand sensory drivers of consumer preference and to identify potential niches in the market.

This lexicon may also find application in psychophysical research by facilitating a more comprehensive and systematic examination of the differences between individuals in perception of wine stimuli. G. Pickering and G. Robert conducted such a study on the oral sensations elicited by red wines,[20] relating variation in perception to an individual's sensitivity to 6-n-propylthiouracil (PROP).

The use of finger touch standards, first proposed by R. Gawel,[11] was universally considered by the panel as valuable in developing a common understanding of many terms, and subsequently in rating these sensations in wine. They also have the advantage compared to traditional oral standards

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Table IV: Definition, reference standard composition and evaluation protocol used for outer-tier descriptors of *integrated* sensations

Outer-tier descriptors	Definition	Standard type	Standard composition and evaluation protocol
Fresh meringue, solid meringue, whipped cream and dessert mousse	A sensation of fullness and the dynamic feeling of expansion typically associated with sparkling wines	Oral	*Fresh Meringue*: beat the whites of 2–3 fresh eggs until stiff peaks form *Solid Meringue*: Presidents Choice™ meringue nests (Fortinos super market, St Catharines) *Whipped Cream*: Cool Whip® (Zehrmart Inc, St Catharines) *Dessert Mousse*: Fortinos super market (St Catharines) bakery mini chocolate mousse
Pressed foam, velvet, small or large marshmallow	An overall sensation of smoothness, volume and depth. *Pressed foam, velvet, small marshmallow* and *large marshmallow* are listed in increasing order of volume and fullness	Manual	*Pressed foam*: 3 cm width x 3 cm length x 0.3cm depth (Walmart™, St Catharines) *Velvet:* 3 cm width x 3 cm length x 0.2 cm depth (Fabricland™, St Catharines) *Small marshmallow:* 2 cm x 2 cm x 2 cm (No Name® brand, Zehrmart Inc, St Catharines) Large *marshmallow:* 4 cm x 4 cm x 4 cm (No Name® brand, Zehrmart Inc, St Catharines) *Foam*: assess using finger and thumb; push along the foam gently while stroking at the same time; *Velvet*: stroke with nap while wiggling the fabric around between forefinger and thumb; *Marshmallows*: apply gentle pressure all over while moving marshmallow around hand
Cloying	High sweetness with a thick and persistent sensation experienced in the back of the throat	Oral	Koolaid® jammers fruit punch (Fortinos super market, St Catharines)
Cleansing	An overall clean, refreshing sensation on the finish of the palate	Oral	lemon water standard (1 lemon quartered and combined with 1 L of Brita®-filtered water and steeped for 10 min)
Felt	Refers to an overall sensation of roughness and drying in the mouth	Manual	3cm wide x 3.5 cm long x 0.2 cm deep strip of felt (Walmart™, St Catharines) Rub between forefinger and thumb
Rich	Integrated with depth and significant complexity and fullness	Conceptual (refer definition)	—
Round	Integrated with depth, reasonable complexity and fullness and without any specific oral sensation dominating	Conceptual (refer definition)	—
Creamy	An impression of mouth-coating, softness and fullness	Conceptual (refer definition)	—
Supple	A soft, gentle, and frictionless impression with moderate to full body	Conceptual (refer definition)	—
Integrated	An impression that oral sensations are combined in good proportion	Conceptual (refer definition)	—
Neutral	Simple integration of oral sensations	Conceptual (refer definition)	—
Disjointed	Lack of integration of oral sensation(s)	Conceptual (refer definition)	—
Insipid	Thin and lacking in complexity	Conceptual (refer definition)	—
Harsh	A rough and grating impression	Conceptual (refer definition)	—
Aggressive	A prolonged and significant impression of harshness across the palate	Conceptual (refer definition)	—

of minimizing fatigue, carry-over effects, and standard preparation time. Their use and further refinement is encouraged in all studies examining non-taste oral sensations. ■

Acknowledgments

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Continued on page 105

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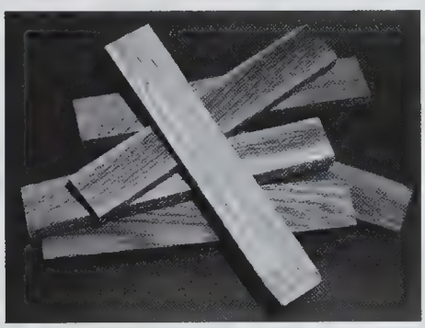

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PART 1

Clonal diversity of Zinfandel

BY Nancy L. Sweet,
Foundation Plant Services, UC Davis,
Dr. James A. Wolpert,
Dept. of Viticulture & Enology,
UC Davis.

Three distinct sources of Zinfandel clones at the Foundation Plant Services (FPS), UC Davis may have developed separately in three countries for well over 100 years. The Zinfandel grape is grown across multiple climate regions, yielding many unique varietal wines. The grape's enigmatic path to California has never been completely resolved and may never be. What is clear is that the grape known in the 19th century as "the Zinfandel" is the only important *V. vinifera* wine variety identified exclusively with California.

Crljenak kaštelanski vine in Croatia. The DNA profile for this Croatian variety has been shown to be identical to California Zinfandel, and vines have been brought to FPS for testing and evaluation. Photo courtesy of Ivan Pejić.

Zinfandel in California

The best evidence suggests that Zinfandel came to California around 1850. Plant material was shared and exchanged freely up and down the state thereafter, especially during the wine boom of the late 19th century when many new varieties were imported from Europe and elsewhere. Along with the new varieties came grapevine virus diseases. Very little was known about the effect of plant viruses on grapevines until the 1940s.

In 1952, the state of California formed an association to develop, maintain, and distribute virus-free grape stock that was true to the variety name.[1] The long history of propagation of the Zinfandel grape from non-certified field selections, and the uncertain origins of the grape, have resulted in the existence of relatively few virus-tested clonal selections of certified origin in California.[11] In 1990, there were only five selections of Zinfandel registered in the FPS collection. Today, 47 selections are "in the pipeline" at various stages of virus testing, cleanup, and inclusion in the Foundation vineyard.

Zinfandel planted before 1910 at Lytton Estate East Vineyard next to Lytton Springs Winery (Sonoma County, CA). The vineyard is an old field selection planted to several varieties including Zinfandel, Alicante Bouschet, Petit Bouschet, Carignan, Mataro, and others. Photo by Ridge Vineyards.

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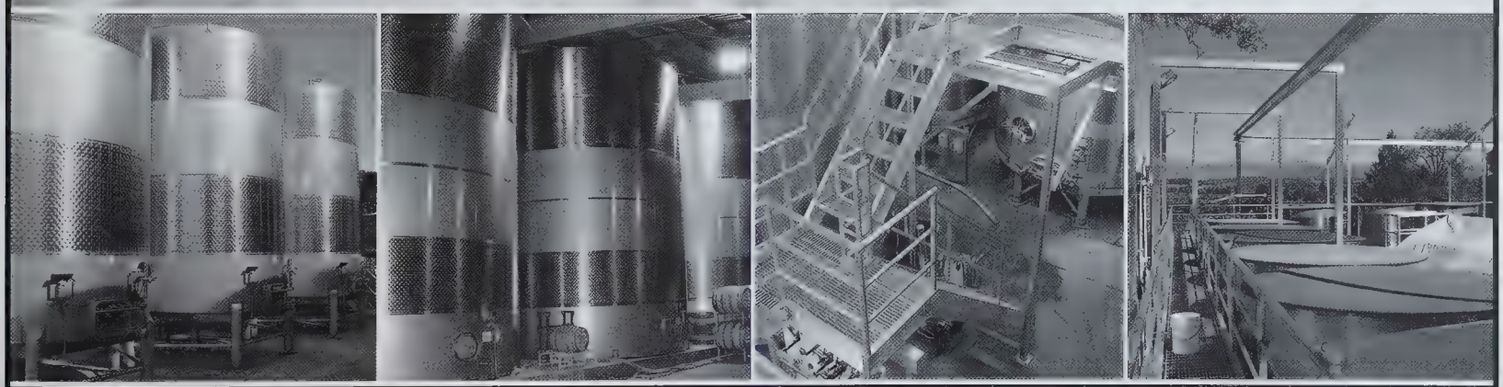

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Zinfandel is the fourth largest winegrape variety in total acreage in California (behind Chardonnay, Cabernet Sauvignon, and Merlot). The California Department of Food & Agriculture (CDFA) reported in April 2007 that there were 52,361 acres of Zinfandel (including Primitivo) grapes planted in 2006.[4]

Although Zinfandel has a presence in 44 counties, the areas with at least 1,000 acres of Zinfandel/Primitivo standing are Amador, Fresno, Kern, Madera, Mendocino, Merced, Napa, Sacramento, San Joaquin, San Luis Obispo, Sonoma, and Tulare counties. These California counties are in all five regions on the Winkler heat summation scale, from the coastal valley and hill areas (regions I to III) to the Central Valley counties and portions of the Sierra foothills (regions IV and V).

Zinfandel wine takes many forms, in part due to the quality of grape, vineyard management practices applied, and location of the vineyard within California's varied topography. Zinfandel grown for red wine production can be either tannin-rich (needing ageing) or light and fruity with softer tannins.[10]

Zinfandel grapes grown in the hotter areas of the Central Valley (regions IV and V) are frequently made into white or pink Zinfandel, with a higher sugar and lower alcohol content. Late-harvested Zinfandel with its high alcohol content is appropriate for port-style dessert wines. The grape is complex and versatile.

The mystery of the origin and identity of California's Zinfandel variety has been reported thoroughly in many scientific journals, including in historian Charles L. Sullivan's *Zinfandel: A History of a Grape and Its Wine*[10] and Dr. Jasenka Piljac's *Zinfandel: A Croatian-American Wine Story*.[8] Definitive genetic analysis in 2003 ultimately made a crucial link, proving that California's Zinfandel, Italy's Primitivo, and Croatia's Crljenak/ Pribidrag all share the same DNA profile.[5,6]

Although the path Zinfandel took to California is still not certain, the most plausible theory of the grape's journey to the U.S. starts with the Austrian Imperial Nursery collection in Vienna, from which amateur horticulturalist George Gibbs brought the grape to Long Island, NY in the 1820s. At that time, the Austrian Empire included the kingdom of Hungary, of which the territory now known as Croatia was a part. The importance of this fact will later become apparent.

In the early 1800s, Zinfandel (known then as Zinfindal, Zenfendel, and Black St. Peters) was used as a table grape grown in hothouses on the East Coast. The origin of the name "Zinfandel" is similarly not clear. However, *A Treatise on the Vine* (1830) by William Robert Prince mentions a "Black Zinfardel of Hungary" in a list of foreign varieties of recent introduction to the U.S.[10]

Zinfandel's journey to California probably occurred around the time of the

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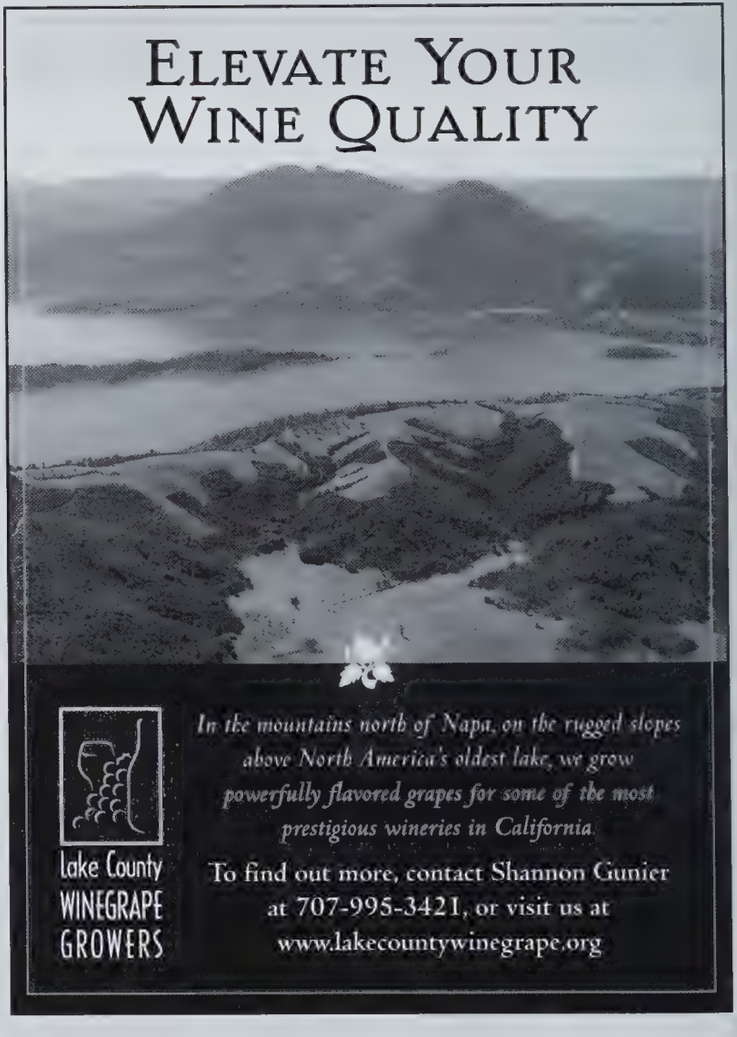
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Gold Rush in the early 1850s. A search of public records by Charles Sullivan revealed that many shipments of *V. vinifera* varieties, including Zinfandel, were made from the East Coast to the West Coast by men such as Frederick Macondray and Anthony P. Smith.

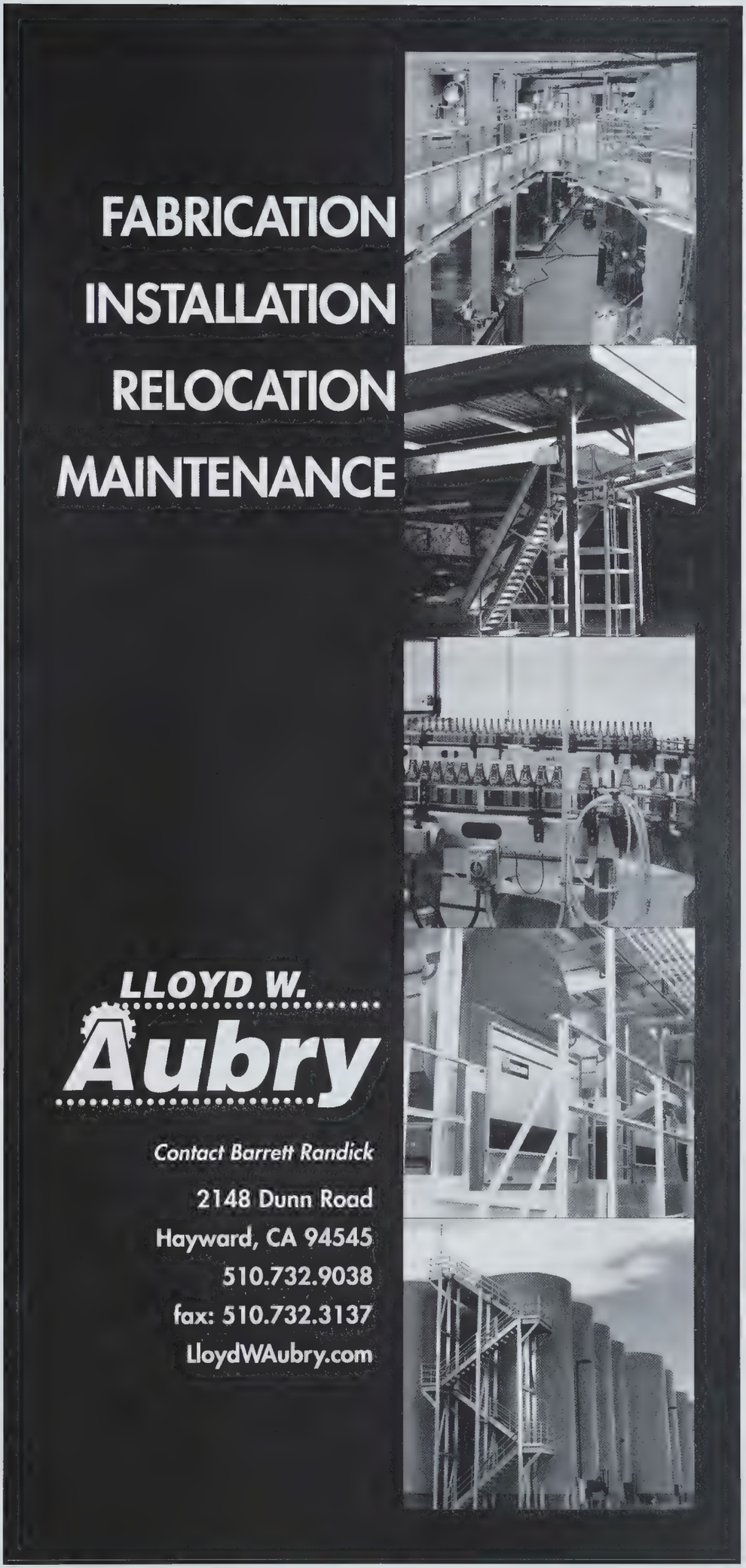
Vinifera varieties were also imported from Europe around that time. Zinfandel began to be recognized as a wine in its own right in the 1860s and then emerged as an exceptional grape variety for winemaking in northern California in the 1880s. Thereafter, the Zinfandel name would be closely identified with the state of California.

Italy's Primitivo grape

At the same time, the Primitivo grape variety developed a reputation of its own in Italy. Primitivo is grown principally in Puglia (Apulia), a long fertile region along the Adriatic Coast in southeast Italy. Puglia, like California, experiences mild, wet winters and hot summers with scarce rainfall. The name "Puglia" derives from the Roman *a-pluvia* or "lack of rain."[9] Because of the high alcohol content and intense pigmentation of the wines made with Primitivo in the area, Primitivo wines are often used in Italy to fortify red wines made in cooler regions. (Golino, personal communication)

One theory posits that the Primitivo grape was taken across the Adriatic Sea from Croatia to Puglia in the 18th century.[5,9] Dr. Giovanni Martelli of the Istituto di Patologia Vegetale in Bari, Italy stated in an email that the first recorded presence of the Primitivo grape in Italy was in Gioia del Colle, a small town in Puglia located in the hills of Murgia. Gioia is situated halfway between the Adriatic and Ionian Seas and halfway between Bari and Taranto. Francesco Filippo Indellicati, a local priest who was also a learned amateur botanist and agronomist, made note of the Primitivo grape in Gioia town records in 1799.

Today, over 70% of the vineyards in Puglia are in the plains, which have very high daytime temperatures. Primitivo is primarily cultivated on the western side of the flat Salento peninsula in Puglia near the city of Manduria, about 100 km southeast of Bari. The Salento peninsula and the Croatian region on the Dalmatian Coast have similar climatic conditions



— marine influence, humidity, and cool summer nights.

Puglia's Salento peninsula, central and southern Dalmatia, and certain warmer areas in the Central Valley of California are in Winkler climate zone IV. However, California's growing season is drier than that of the central Dalmatian Coast.[6]

In the late 1960s, Dr. Austin Goheen (USDA-ARS Plant Pathologist) discovered the Italian grape. He was dining one evening in Italy with Dr. Martelli when he tasted a wine he thought was a Zinfandel. The two men then went to a vineyard located between Bari and Gioia del Colle (40 km southeast of Bari), where Goheen collected the plant material that eventually became Primitivo FPS 03. He brought some plant material back to the USDA facility in Davis, CA.

Primitivo and Zinfandel compared

Once Primitivo and Zinfandel were planted side-by-side, they appeared to be the same variety.[6,7] Subsequent genetic comparison (isozyme patterns, restriction fragment length polymorphisms, microsatellite alleles) confirmed that the two grapes share the same genetic profile.[3,6]

Although the DNA profiles for Zinfandel and Primitivo appear to be identical, some clonal divergence seems to have resulted over time, most likely attributable to the lengthy period of independent development of the two grapes in California and Italy, respectively. (DNA profiles are excellent for distinguishing between grapevine varieties but cannot be used to identify clones.)

Dr. Andrew Walker states that although it is difficult to visually distinguish California Zinfandel selections from the Primitivo selections now in the FPS collection when they are growing side-by-side in the field, there are some subtle differences in appearance.[12] Primitivo berries are slighter smaller than Zinfandel; the size discrepancy is only noted if the two grapes are simultaneously viewed together or if one measures the berries.

Both Primitivo and Zinfandel have tight clusters and thin skin, which favors bunch rot with this genotype. However, Primitivo has looser clusters than Zinfandel, and consequently is less susceptible to rot.

In some environments, Dr. Walker has also seen a slight difference in hairiness on the leaves of the two groups of grapes. In California, Primitivo leaves can have felty, dense hair on the back of the leaves, while Zinfandel leaves have a cobwebby consistency. More observation across leaves of similar age and in similar climates and locations is needed to make a conclusive finding on differences between the leaves.

In a communication to the Alcohol & Tobacco Tax and Trade Bureau (TTB) of the U.S. Treasury Department on the issue of whether or not Zinfandel and Primitivo should be treated as synonyms for purposes of wine labeling, Dr. Carole Meredith (UC Davis), whose

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lab was the first to make a genetic comparison of the two grapes, noted that the independent propagation of the two varieties has resulted in small differences, such as berry size or fruit composition, that she believed could be significant for winemaking.

Although the European Union recognizes the name Zinfandel as a synonym for the Primitivo grape, the TTB continues to maintain them as separate prime grape variety names used to designate American wines. Consequently, Zinfandel and Primitivo may not be used as synonyms on wine labels for wines made in the U.S.

Zinfandel's Croatian relatives

The search for the "true origin" of the Zinfandel grape took a new path in the 1990s. As noted above, it is thought that Zinfandel may have its origin in Hungary or other areas of Eastern Europe, practically all of which was within the Austrian Empire at the time Zinfandel was brought to the U.S.

Edi Maleti and Ivan Peji (Faculty of Agriculture, University of Zagreb) and local experts in Dalmatia identified a Croatian grape called Plavac mali, an autochthonous Dalmatian cultivar that looked like Zinfandel. The Croatian scientists collaborated with Dr. Meredith to test the DNA profile of Plavac mali against Zinfandel and Primitivo.[7] The profiles did not match. The similarity of the two grapes was later explained by the discovery that Zinfandel is one of the parents of Plavac mali.[5]

In 2001, the Croatian scientists found another local vine called Crljenak kaštelanski ("the red from the town of Kašteli") in a coastal town called Kaštel Novi in central Dalmatia north of Split. The Kaštela region has been a winegrowing area since before the Roman occupation. The climate is characterized by long, warm summers and mild winters, although the climate in Kaštela is wetter than that of California during the growing season.[5] In 2002, additional vines known locally as Pribidrag were found in the Dalmatian coastal town of Omi.

Crljenak and Pribidrag looked morphologically identical to Zinfandel. Drs. Maleti and Peji sent the vines to Dr. Meredith, who confirmed that the DNA profile of the two grapes was

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identical to that of Zinfandel.[2] Records and herbarium specimens in Croatia indicate that this cultivar (known in Croatia by many synonyms) was once prominent in Dalmatia and either originated in Kaštela or had a lengthy association with that region.

The scientists also concluded that their research results are consistent with Zinfandel belonging to the broader Croatian gene pool in Dalmatia (as opposed to gene pools in Greece and Italy). The vines found to be identical to Zinfandel are rare in Croatia today.[5] In fact, prior to its discovery in 2001, Crljenak had not been bottled as a varietal in its own right in Croatia.[12]

One of the active parties in the effort to bring the Croatian grapevines to California is Ridge Vineyards, which imported Crljenak kaštelanski and Pribidrag plant material to the U.S. via FPS in 2002 and 2005, respectively. The source of the Crljenak vines was Kaštel Novi, Croatia, and the Pribidrag was from Svinisce and Marusici, Croatia. Ridge Vineyards and the Croatian scientists hope that testing under experimental conditions will show that the Croatian clone line possesses qualities that could enrich California Zinfandel wines.

David Gates (vice-president of Ridge Vineyards) states, "The genetic variability in these selections from Croatia will hopefully add a bit more complexity and diversity to California Zinfandel. It will be fun to see, in the coming years, just how that genetic variability will express itself — viticulturally and in the wines made from these grapes."

FPS selections of both Zinfandel and Primitivo were sent to Croatia as part of this international exchange, where they will be compared to indigenous clones for vineyard and winemaking performance.

The original Crljenak plant material suffered from virus and underwent shoot tissue culture propagation and virus testing. The Pribidrag is a few years behind that. Once selections of each qualify for the California Grapevine Registration & Certification (R&C) Program, they will be released from federal quarantine, planted in the FPS Foundation vineyard, and distributed to Ridge Vineyards. Ridge Vineyards will retain an exclusive right to the plant material for two years, after which each selection will be available to the public.

Genetic diversity

Most of the Zinfandel plant material in California originated with vines imported into the state in the mid-1800s. Trials are underway to explore the clonal diversity of "Heritage" Zinfandel from around California with the hope of finding superior material well-adapted to California vineyard conditions. (See **Public Heritage Zinfandel Clones** in Part II [March/April 2009]) The discovery of the Croatian Zinfandel selections growing under the names Crljenak and Pribidrag could have a significant impact on the genetic diversity of the Zinfandel clonal material in California.

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Since Crljenak/Pribidrag were originally cultivated in Eastern Europe, it would be reasonable to expect the greatest diversity of clonal variation would be in this region, perhaps with unique qualities that new clones of the grape from Croatia might offer to winemakers.

Primitivo offers another source of genetic diversity for California's Zinfandel, since there may be important clonal variation in Italy. It is unknown at this time whether the selections of Primitivo introduced by Dr. Goheen are typical of Italian clones.

FPS identification methods

It may be helpful to review some of the conventions at FPS for the identification of selections. Because it is difficult to tell clones apart objectively, and duplicate clones may come to the FPS collection from more that one source, each introduction receives a unique FPS selection number to preserve its identity.

In addition, sub-clones that have been produced by heat treatment or tissue-culture virus-elimination therapy also receive unique numbers, since their clonal performance may vary because of changes in vine health due to differing virus status or even the possibility of mutation during therapy.

Registered FPS public selections

The registered and certified Zinfandel selections currently available to the public at FPS include Zinfandel FPS 01A, 02, 03, and 06. There are also a number of proprietary selections maintained at FPS for various owners.

Zinfandel FPS 01A and **Zinfandel FPS 02** came to FPS in 1961 from a vineyard in Lodi owned by Leon Handel. The climate in the Lodi-Woodbridge area is amenable to growing good-quality Zinfandel grapes due to the marine influences permeating the San Joaquin Delta region of the Central Valley. San Joaquin County has led the state in total Zinfandel acreage since the middle of the last century.[10]

Statistics reported by CDFA in the 2006 Grape Acreage report show that the San Joaquin Valley now has about 20,200 acres of Zinfandel (including Primitivo) of the approximate 50,000 acres of Zinfandel grapes planted in California.

The original plant material from Lodi tested negative for virus. Zinfandel FPS 01A and 02 were registered in the California Grapevine R&C Program in 1962 without any kind of virus elimination treatment. Both selections are still available from FPS as California Foundation stock.

Zinfandel FPS 06 was propagated from Zinfandel FPS 01A in 1966. The difference is that Zinfandel FPS 06 underwent heat treatment for 117 days. It first appeared on the registered selection list in 1967 and has consistently tested negative for all viruses.

Zinfandel FPS 03 came to FPS in 1964 from a vineyard (Reutz #1) near Livermore, CA. Zinfandel has a long tradition in the Livermore Valley and was planted there as far back as 1885.[10]

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According to Phil Wente of Wente Vineyards, the Reutz vineyard was 40 acres owned and farmed by Reinhardt Reutz on Vineyard Avenue, just southeast of Pleasanton, CA. The vineyard had been planted during Prohibition and, over the years, the grapes were sold to Ruby Hill Winery, Cresta Blanca Winery, Almaden, and Wente Bros. Winery.

Wente explains, "When UC Davis began the process of collecting vines for the Foundation vineyard, my grandfather, Ernest Wente, told Harold Olmo that the best Zinfandel in the Livermore Valley was grown in the Reutz Vineyard. A number of other premier varieties were selected from the Livermore Valley as representative of their overall quality, and it was only natural that Zinfandel from this region would be considered also, based on the quality of wines produced over the years from the Reutz Vineyard."

Zinfandel FPS 03 did not receive heat treatment, and first appeared on the list of registered selections for public distribution in 1965. It is still available from FPS as California Foundation stock.

Primitivo FPS 03, 05 and **06** were imported from Italy. Primitivo FPS 03 was obtained in 1968 by Dr. Austin Goheen through the Istituto di Patologia Vegetale in Bari, the capital city of the Puglia region. The material that became Primitivo FPS 03 underwent heat treatment for 59 days before coming to the U.S. as USDA plant introduction (PI)325796-A-1. For a while, even after planting in the Foundation vineyard in 1971, the selection was known as Primitivo di Gioia, a synonym for Primitivo in the Vitis International Variety Catalogue.

Some time prior to planting in the Brooks South vineyard in 1984, the name of this selection was changed to simply "Primitivo." Dr. Martelli explained that the name "Primitivo di Gioia" is the "older" denomination of the variety and cannot be used any longer, even in Italy, because the European Union has determined that the names of grape cultivars grown in the EU cannot contain links to geographical locations. The TTB has imposed the same rule in the U.S.

After arrival in UC Davis, the original mother plants of Primitivo FPS 03 tested negative for virus. Mother plants were established in the FPS Foundation block in 1971 but not professionally identified. Primitivo FPS 03 was first registered and distributed to the public in 1984 and it still available from FPS as California Foundation stock.

Primitivo FPS 05 and **06** are two of four selections that were sent from Italy to FPS in 1987 by Dr. Antonio Calò (Istituto Sperimentale Viticoltura — which has since been renamed Centro di Ricerca per la Viticoltura), in the Veneto region of northeast Italy. The Istituto is an experimental viticultural station established in 1923 in Conegliano and houses an ampelographic collection of more than 2,000 grape varieties.[9]

Continued on page 105

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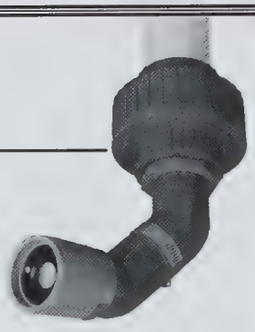

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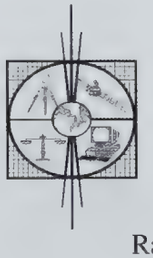

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Integrity Award to Karen Ross

California Association of Winegrape Growers

When the Lodi Winegrape Commission gave the 2008 Wine Integrity Award to Karen Ross, president of the California Association of Winegrape Growers, at the Lodi Wine & Visitor Center in October, five industry associates saluted Ross with words of praise. The Wine Integrity Award was created by the Lodi Winegrape Commission in 1998.

Karen Ross and husband Barry

Jim Trezise,
New York Winegrape Foundation

In 2006, the Lodi Winegrape Commission was kind enough to present me with the wonderful Integrity Award — and then there was a deafening silence. No Integrity Award was given in 2007 — no mention of why. I figured that meant you realized that you'd made a mistake or hit rock bottom and would discontinue it.

I am glad you didn't, and I am especially glad that our friend Karen Ross is being honored in 2008. How richly deserved that is. Several years ago the Lodi Winegrape Commission created this award to recognize people who have made major contributions to the American grape and wine industry in a spirit of integrity.

Some of you may know that when Bob Hartzell announced his retirement from the California Association of Winegrape Growers (CAWG) a dozen years ago, I was one of the candidates approached and initially interviewed for the job. CAWG chose a far better leader, and one who has been an inspiration to me — though I still don't understand how someone from Nebraska ended up in the winegrape business. Karen, the native Nebraskan, is passionate, dedicated, talented, cooperative — and just plain fun.

We all have challenges in our working lives, whether we're growers, winemakers, or wine marketers. But speaking from personal experience, I can say that running a trade association has its own special challenges, which require special qualities — the eagerness to listen, the talent to build consensus among different viewpoints, the diplomacy to disagree without being disagreeable, the vision to make the future better, and the courage to lead. Karen has all of those qualities!

I had the privilege of serving on the 2008 Wine Integrity Award nominating committee. It was truly an uplifting experience, which reminds us all that there are a lot of really fine people in the grape and wine community. But what was really interesting is that all committee members nominated Karen, and all used the word "glue" in describing what makes her so special. She not only brings people together, she keeps people together.

I've known Karen for more than 12 years, since she became President of CAWG, and I see her many times each year. Besides doing a great job of directly representing the interests of her members, she works with virtually every organization, committee, cause, or project that will advance the interests of the overall grape and wine community, not just in California but throughout the U.S. and the world. Her resume has so many of these listings that I declined to print it out so I could save a tree and practice sustainability.

My view on Karen is more on a national and international level, which are every bit as important because this is truly a global industry and everything is intertwined.

Two years ago at the Integrity Award dinner, I applauded the "Lodi mafia" of wonderful growers who are so responsible for where we are today. With leadership from CAWG and Bob Hartzell, they formed Winegrape Growers of America (WGA), inviting growers from tiny states like New York to join in forging a better future through enlightened public policy.

In addition to continuing to provide vital leadership for WGA, Karen has been deeply involved in the WineVision movement, the National Grape & Wine Initiative (NGWI), and many other efforts that require "glue" to hold everything together for the common good.

We thank Karen, and we thank the Lodi Winegrape Commission. Years ago when I first joined this crazy business, in most small states there was suspicion and resentment toward California — the 800-pound gorilla that dominates everything. That has been replaced by collegiality and gratitude, reflecting the broad awareness that California is in fact a friendly gorilla, which has lifted us all to new and unimagined heights.

Karen is a great example of why that attitude has changed. She is the "Energizer Bunny" inspiring us to work harder and smarter, the diplomat who laughs at John Martini's (Anthony Road Wine Co., New York) jokes, the teacher who reminds us that we are a community, the community organizer who brings us all together, and the leader who, at the end of the day, gets results beyond anyone's expectations, not just for California but for the whole country.

One dramatic example: Nebraska now has more than 20 wineries!

Karen, congratulations, and from all of us in other states, Thank You.

Gladys Horiuchi,
Wine Institute Communications Manager

Many of us at the Wine Institute have appreciated and enjoyed working with Karen over the years.

I remember when Karen first joined the California Association of Winegrape Growers because it was about the same time that I joined the Wine Institute — in February 1996. From the beginning, Karen was a collaborator who has always been personable and knowledgeable, graciously willing to share her insights to help the industry as a whole.

In my world of working on media relations at Wine Institute, we have to

research and draw upon the knowledge of many industry experts. Karen is certainly one of those experts who has helped us, as she is articulate, politically savvy, and a person who builds bridges.

She has collaborated with the Wine Institute on several issues. Some of these topics are sustainable winegrowing, vineyard labor issues, pesticide use, light brown apple moth, genetically modified organisms, Pierce's disease, and other issues.

Karen is an incredibly positive and energetic person, and a great collaborator who always manages to help steer the right course for the industry.

Karen, thank you for all you do. You are the glue who brings a lot of us together, and I have appreciated knowing and working with you.

Allison Jordan, Wine Institute
Director of Environmental Affairs

I have had the privilege of knowing Karen for five years, largely within the context of the Sustainable Winegrowing Program — a true partnership between Wine Institute and CAWG that continues to bring out the very best in the wine community.

It is in no small part her visionary outlook that helped move the industry down the sustainability path, and we are so thankful for her ongoing leadership in this increasingly important, industry-wide effort.

I have seen Karen's visionary capabilities in action through her work for the Unified Wine & Grape Symposium and the NGWI, and her passionate support for research to ensure the long-term health and viability of our industry.

Several characteristics contribute to Karen's ability to galvanize others toward a shared vision:

- Her unparalleled knowledge of the industry;
- Her spunk, contagious enthusiasm, and positive outlook; and
- Her incredible talent for linking people and resources.

Karen is able to navigate an unenviable number of issues and projects, and yet always manages to see the big picture, the best way forward. Somehow she just seems to have more hours in the day than the rest of us.

Karen, I have learned so much from you. You have my utmost respect and admiration. Those of us who work closely with you will always be looking forward to what is around the corner — because we just

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Nancy Light, Wine Institute Director of Communications

I have worked closely with Karen on many projects, including our Sustainable Winegrowing Program and the California First marketing program, over the past four years.

She is a prodigious contributor and has the ability to seemingly be in two — and sometimes more — places at once.

She has boundless energy and enthusiasm, but her capacity to contribute to so many important initiatives for her growers, for our industry, and our state is second to none.

Whether representing CAWG, collaborating with Wine Institute and NGWI, serving on the State Board of Food and Agriculture, or working with the many other groups who benefit from her for ideas and experience, Karen is always there when we need her.

Karen, thank you for being there — always in good humor — and for everything you do for our industry.

Rodney Schatz, former chairman of CAWG

When Mark Chandler (Executive Director, Lodi Winegrape Commission) asked me to say a few words about Karen, I was happy to do it. But everyone knows Karen. Even if they don't know her, when they are in the same room with her they will soon know her! Her generous smile and her enthusiasm and her energy and her ability to get results — that's who Karen is.

When I was chairman of CAWG, I used to go around with her and she would introduce me as her boss — but she is the boss! What is a boss? It is someone who listens and encourages. That is what makes Karen effective. She brings people together to get things done. CAWG grower members and the industry are the beneficiaries of her ability to do that. Thank you, Karen, for all that you do to make CAWG a better, stronger organization.

Thanks from Karen Ross

Thank you Lodi Winegrape Commission for this wonderful award and for your continued leadership. I especially appreciate that, ten years ago — before it was cool — the Lodi Commission set out to honor integrity, which is so valued in these tumultuous times. Brad Alderson (former vice president of Woodbridge by Robert Mondavi), congratulations to you on receiving the Lodi Merit Award. When I was thinking about receiving the Integrity Award, I wrote down three words and one of them was "lucky," and Brad also mentioned that when he received his award.

I am so **lucky** to have the job that I have and to work for growers. I get to go to work every day and represent you and work in this wonderful wine community and I love every minute of it! I'm from Nebraska and now I get to live in this great state with its unique natural resources and a fantastic climate and smart, innovative growers who are committed to the land, to their families, and to their communities, and who provide leadership to CAWG for the good of the industry as a whole.

I was lucky for Bob Hartzell's dedication to CAWG as the first CAWG president and for the graceful transition that started June 17, 1996 — my first day.

But the real reason I am so lucky is because of the **people**, the second word I wrote down. You — every one of you in this room. I have worked with great chairmen — four from Lodi: Randy Lange, Jerry Fry, John Ledbetter, and Rodney Schatz. It is always the people who make the difference and bring such joy to the job. CAWG directors are honest, innovative and proactive, down to earth, and generous.

Here in California, I have had the great good fortune to work with fantastic organizations and talented, dedicated people on all the things we have in common, like Wine Institute — we have a great relationship and thank you Nancy, Gladys, and Allison for being here tonight; Family Winemakers of California, Allied Grape Growers, American Vineyard Foundation, and all the people at the regional associations like Mark Chandler (Lodi), Nick Frey (Sonoma County), and Stacie Jacobs (Paso Robles), just to name a few.

Beyond California, how lucky I am to work with people at the national level and in other states including WineAmerica (Pete Downs is chairman), Winegrape Growers of America (Vicky Scharlau in Washington state, and Jim Trezise and the Martinis in New York), Ted Farthing in Oregon, Linda Jones in Michigan, Donnie Winchell in Ohio, Margo Metzger in North Carolina, Dacota Julson in Texas — what a treat it is to work with each and every one of them.

A great big thank you to my staff, the best ever!

The last word I wrote down is from my Dad — **passion**. Before 3M ever created sticky notes, Dad wrote messages on pieces of paper and taped them to the wall in my bedroom or on the bathroom mirror or the refrigerator door — things like "think positive," "act positive," or "be positive." He wanted me to find my passion and pour everything into it.

I used to tell him after a day of doing summer fallow or chasing cattle — things grape growers might not relate to — that I was not going to stay in Banner County and marry a farmer. But every job I have ever had has been in agriculture. Ag is my passion! I love it and I want to support it and I want to make sure it is a vital part of California for generations to come.

I'm lucky to work with great leaders who share that passion. Recently Bob Gallo had a group of us together to talk about farm land preservation. One of my heroes is Jerry Lohr, who is passionate about investing in research to make sure we stay around.

Finally, I want to thank my husband, Barry. Twenty years ago he told me we were going to California for the job he always wanted. I said that's great and burst into tears because I did not know California had agriculture! Thanks to you, Barry, I am here, and there is agriculture, and every day I get to work with great people and do what I am passionate about. I am so lucky!

Thank you Lodi Winegrape Commission for the Integrity Award. ■

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TEXT CONTINUATION

White Wine Mouthfeel
Continued from page 89

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Zinfandel Clones
Continued from page 100

Selections 1 and 2 sent by Dr. Calò are now Primitivo FPS 05 and 06, respectively. These Primitivo selections were provided to FPS at the request of Dr. Goheen, who sought more Primitivo selections to compare to Zinfandel. Both selections tested negative for viruses and became registered in the R&C Program in September 1994. ■

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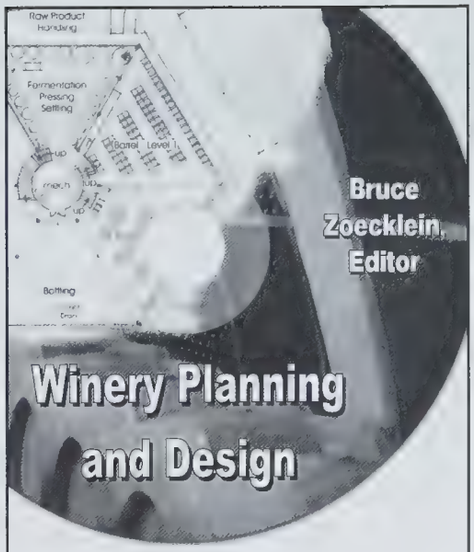

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Nematode-resistant rootstocks released to nurseries

BY **Andrew Walker, Professor and Grape Breeder, Department of Viticulture & Enology, UC Davis, Howard Ferris, Professor and Nematologist, Department of Nematology, UC Davis**

Development of new rootstocks with broad and durable nematode resistance began in 1993/1994, with crosses made to enhance nematode resistance and improve rooting ability and shoot characteristics including internode length and the extent of lateral shoot production. Parents of these crosses included a number of grape species known to be highly resistant to both root-knot and dagger nematodes. They included several forms of *Vitis arizonica, V. candicans, V. champinii, V. cinerea, V. rufotomentosa,* and *Muscadinia rotundifolia.Vitis riparia* and *V. rupestris* were used in the crosses to improve rooting.

About 75 crosses were made, leading to establishment of more than 5,000 seedlings. In 1996, these plants were evaluated for shoot growth, internode length, and presence of laterals. One thousand selections were chosen, and they were later tested for their ability to root from dormant two-node cuttings. The best 100 were advanced to nematode testing.

In preparation for nematode-testing, soil samples with populations of root-knot nematodes capable of feeding on and damaging Harmony rootstock were obtained from Mike McKenry (University of California, Riverside). Peter Cousins (then a PhD student in the Walker lab), extracted nematodes from the soil samples and isolated two strains of root-knot nematode (RKN) that fed well on Harmony. These two strains were named Harm-A and Harm-C.

Kris Lowe (a recent PhD student in the Walker lab), characterized the Harm-A and Harm-C strains as *Meloidogyne arenaria* and *M. incognita,* respectively. A standard strain of *M. incognita* (termed R3), capable of damaging grapes, but not able to feed on Harmony or Freedom rootstocks was obtained from the Department of Nematology. *Xiphinema index* (the dag-

Table I. Parentage and nematode resistance of rootstock candidates that underwent certification testing at Foundation Plant Services. Combined testing involved the standard strain of *Meloidogyne incognita* (root-knot nematode), two aggressive Harmony/Freedom strains, and dagger nematode *Xiphinema index*.

8909-05 (UCD GRN-1™)	9363-16 (UCD GRN-2™)	9365-43 (UCD GRN-3™)	9365-85 (UCD GRN-4™)	9407-14 (UCD GRN-5™)
V. rupestris x *M. rotundifolia*	(*V. rufotomentosa* x (Dog Ridge x Riparia Gloire)) x Riparia Gloire	(*V. rufotomentosa* x (Dog Ridge x Riparia Gloire)) x *V. champinii* c 9038 (probably *V. candicans* x *V. monticola*)	(*V. rufotomentosa* x (Dog Ridge x Riparia Gloire)) x*V. champinii* c 9038 (probably *V. candicans* x *V. monticola*)	(Ramsey x Riparia Gloire) x *V. champinii* c 9021 (probably *V. candicans* x *V. monticola*/*V. berlandieri*)
Characteristics: No galls in combined testing; resists citrus, lesion, and ring nematode. Less easy to medium propagation ability. Studies underway to determine fanleaf tolerance. Deep-rooting profile. Leaves are shiny and intermediate between *V. rupestris* and *M. rotundifolia*. Sterile flowers.	**Characteristics:** No galls in combined testing; resists lesion nematodes, has moderate resistance to citrus nematodes; susceptible to ring nematodes. Good mothervine with long canes and internodes, and limited lateral production. Shallow rooting depth. Mature leaves are three- to five-lobed and have some similarity to *V. aestivalis*. Male flowers.	**Characteristics:** No galls in combined testing; resists lesion and citrus has moderate vigor, but long canes with good internode length, moderate number of laterals. Moderately deep rooting depth. Mature leaves resemble *V. champinii*. Female flowers.	**Characteristics:** An average of less than one root gall in combined testing; moderate resistance to ring nematode. Good mothervine with long canes and internodes and few laterals. Moderately deep-rooting profile. Mature leaves resemble *V. riparia*. Male flowers.	**Characteristics:** No galls in combined testing; resists citrus and lesion nematode, moderate resistance to ring nematodes. Weak mothervine, but long internodes, good canes.Deep-rooting profile. Mature leaves resemble glossy *V. champinii*/*monticola*. Male flowers.

ger nematode vector of grapevine fanleaf virus) was extracted from several highly infested sites in Napa Valley. These nematodes were used in the first phases of nematode resistance evaluations, as single and then combined inoculum.

Initial work began by optimizing the nematode-screening procedures. Observing galls that form as a result of RKN feeding can be difficult. Peter Cousins modified an egg mass staining technique that was developed for RKN studies on tomato, and that technique was used to confirm that RKNs had penetrated, fed, and reproduced on the roots. As the nematode testing progressed, Liang Zheng (technician in the Nematology Department) became responsible for evaluating selections for resistance to various strains and combinations of nematodes.

Root-knot nematode resistance was evaluated by counting the number of stained egg masses produced on a root system after inoculation with 1,500 juvenile nematodes. Those without egg masses were judged to be resistant.

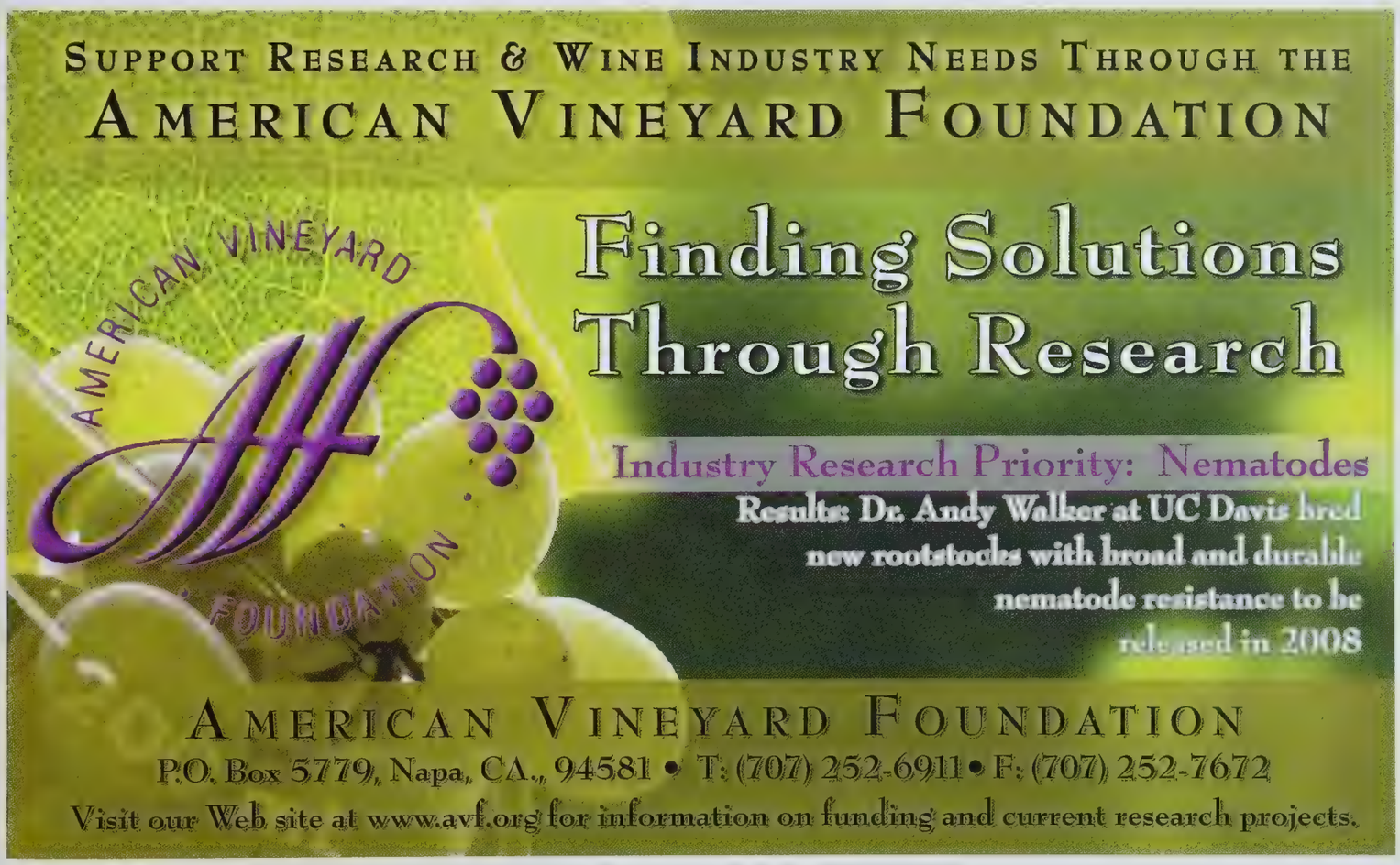
Dagger nematode resistance was determined by counting the number of galled roots after inoculation with 150 nematodes. Testing was also done for resistance against citrus nematode (*Tylenchulus semipenetrans*), lesion nematode (*Pratyclenchus vulnus*), and ring nematode (*Mesocriconema xenoplax*).

The first round of testing examined the ability of the 100 selections to resist the RKN R3 strain. Selections that resisted R3 feeding were then tested for resistance to the Harm-A and Harm-C strains, followed by testing for resistance to the dagger nematode. This round of screening identified 33 selections with strong resistance to each of the four nematode strains. These 33 selections were then tested against a combined inoculum using the four nematodes (R3, Harm-A, Harm-C, and dagger), which resulted in a group of 14 resistant selections. These 14 selections were also tested for resistance to citrus, lesion, and ring nematodes.

Durability of nematode resistance was tested by evaluating the selections to four nematode strains (R3, Harm-A, Harm-C, and dagger) at elevated temperatures. Resistance to RKN strains in tomatoes and other crops has been shown to break down when soil temperatures reach about 80°F.

The 14 selections were then tested to determine whether their RKN resistance was based on a similar temperature-sensitive mechanism. The selections were tested at four temperatures: 75°, 80°, 86°, and 90°F (24°, 27°, 30°, and 32°C), using the cultivar French Colombard as the susceptible control and Harmony rootstock as the standard. At 80°F, Harmony's moderate resistance to Harm-A was dramatically affected. It was as susceptible as French Colombard to RKN feeding.

These rootstock selections have been tested in large pots filled with vineyard soil from sites with severe nematode infestation to more closely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approximate field conditions. The soils had high levels of RKN and ring nematodes, lesion nematodes, and *Xiphinema americanum*. Harmony rootstock was planted in 4-inch pots with one of these soils, as a control, and more than 100 RKN egg masses were recovered in seven weeks.

Five rootstocks released to nurseries for expansion

Five selections emerged from this screening and they have been released to nurseries to expand for commercial distribution.They have been patented and trademarked as UCD GRN-1™ through UCD GRN-5™.These trademarks were chosen to indicate the development was done at UC Davis and they are Grape Rootstocks for Nematode resistance.

It will take years to determine which vineyard sites these rootstocks are best suited to, but they have unparalleled levels of resistance to nematodes and should excel in sites with single and mixed nematode species infestations. They are all planted in field trials in sites with severe chronic nematode pressure.

Rooting angles of the released rootstocks have been evaluated using herbaceous and dormant cuttings as a rough approximation of rooting depth and ability to induce vigor. A wide range of rootstocks are also being examined to better establish the correlation between rooting angle from herbaceous and dormant cuttings, and known vigor levels in vineyard situations.

The most resistant of the releases is 8909-05 (UCD GRN-1™), it was highly resistant to all of the nematodes tested. This rootstock came from a group of 16 *V. rupestris* x *M. rotundifolia* seed populations that Harold Olmo made. Recently, it was discovered that almost all of these seedlings were not the result of the intended crosses, but instead were the result of pollen contamination from grape species that Dr. Olmo collected in Mexico.

Many of these selections have exceptional resistance to Pierce's disease and dagger nematodes. UCD GRN-1™ is a true *V. rupestris* x *M. rotundifolia* hybrid, and may possess the ability to tolerate fanleaf virus infection in a manner similar to the *V. vinifera* x *M. rotundifolia* rootstock O39-16. This tolerance is critical, since resistance to *X. index* feeding does not prevent the vectoring of, and infection by fanleaf virus.

Work is underway to determine whether UCD GRN-1™ is capable of preventing fanleaf disease. Cuttings of UCD GRN-1™ produce relatively few roots, and root at a slower rate, than other newly released rootstocks. These rooted cuttings have deep rooting angles, although not as deep as O39-16.

The 9363-16 (UCD GRN-2™) release is a cross of (*V. rufotomentosa* x [Dog Ridge x Riparia Gloire]) x Riparia Gloire that acquires its nematode resistance from *V. rufotomentosa* and *V. champinii* (Dog Ridge). It has lobed leaves similar to *V. rufotomentosa*, but they are relatively hairless, a trait acquired from *V. riparia*. UCD GRN-2™ propagates well, and produces roots with relatively shallow rooting angles. It is a good mother-vine and has excellent nematode resistance; although it is susceptible to ring nematodes.

9365-43 (UCD GRN-3™) is a cross of (*V. rufotomentosa* x [Dog Ridge x Riparia Gloire]) x *V. champinii* c9038 and has nematode resistance from *V. rufotomentosa*, *V. champinii* (Dog Ridge) and c9038 — a wild collection from Texas that appears to contain *V. monticola*, a *Vitis* species that grows on very dry limestone soils climbing on mesquite and juniper in west-central Texas.

UCD GRN-3™ looks like a form of *V. champinii* and produces moderately vigorous mother-vines with long canes and moderate lateral production. The cuttings root very well, and their rooting angles are intermediate in depth. It has excellent nematode resistance and has moderate resistance to ring nematodes.

9365-85 (UCD GRN-4™) is a sibling of UCD GRN-3™, but appears more like *V. riparia*. This may translate into reduced vigor, but the rooting angles of the two siblings are similar. Nematode resistance of UCD GRN-4™ is slightly less than UCD GRN-3™, but it is a more vigorous mother-vine.

The cross 9407-14 (UCD GRN-5™) of (Ramsey x Riparia Gloire) x *V. champinii* c9008 has strong and broad nematode-resistance from *V. champinii* (Ramsey) and c9021, a *V. champinii/monticola* selection from west-central Texas. However, it is susceptible to ring nematodes. The mother-vine resembles a glossy-leaved version of *V. champinii*. The canes are long, straight, and produce few laterals, but the mother-vine is relatively weak. Cuttings produce moderate-size roots with relatively deep rooting angles.

Summary

The lack of effective fallowing and crop rotation in vineyards are key factors leading to a nematode's potentially large negative impact on vineyard establishment and longevity.

These new rootstock selections were designed to durably resist a broad range of nematodes, enabling their use in infested sites without the use of nematicides and multi-year fallow periods. They also present a diverse range of nematode-resistance, providing more choices for rootstock rotation when vineyards are replanted. ■

This text is edited from first publication in the FPS Grape Program Newsletter, November 2006.

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Starmont

Continued from page 18

4. A semi-automated gradual lowering of glycol temperature, eliminating the chiller energy-use spike associated with the temperature change that occurs when switching to cold stabilization from fermentation and normal storage. Starmont winemakers select "cold stabilize" mode from the equipment schedulers for the chiller, compressors, and tanks. The Logix system then smoothly manages the temperature transition with no further interaction required.

5. An air handling unit "standby" mode that stops cooling during worker activity periods. This prevents the refrigeration equipment from needlessly responding to temporary cooling demand spikes caused by heat infiltration as workers go in and out of barrel rooms.

6. Air handling unit cooling control of one room based on wine barrel temperature. This significantly reduces short cycling of air units without risk to wine quality from improper temperature.

7. Use of outside night air for cooling when temperature and humidity conditions permit, eliminating refrigeration energy for those loads.

Thanks to a collaboration between the APCCO refrigeration design engineer, Logix controls manufacturer, and Starmont staff, the Starmont facility now enjoys one of the most energy-efficient refrigeration systems in the wine industry. The first four control measures above have been documented to reduce winery energy use by 42% in a similar setting.

Electric forklifts

Starmont is using four electric forklifts for crush, barrel movement, and bottling. Two Jungheinrich 80-volt models were provided by Accurate Forklift (Santa Rosa, CA).

"We liked the idea of using electric instead of fuel-powered," says Foster. "The toughest test for the electric forklift is getting up the slope from the winery to the crushpad where bins of grapes are received."

"The use of the Jungheinrich forklift at Starmont is unique in the forklift industry," says Sam McHenry (Accurate Forklift). "As Sean states, an incline grade is the toughest test. The Jungheinrich lift has an 80-volt DC battery with a 3-phase AC power system for its motive power, allowing better climbing ability since the motors do not get hot so fast.

"To improve performance on a grade, the Jungheinrich also has 'curve control,' which judges the speed of the lift and the angle of the steering to help prevent rollover. The control automatically slows the machine to meet the proper speed of the steering angle. The lift will engage the brakes if you stop on a grade, keeping the machine from rolling back when you start moving again."

Foster reports the forklifts are charged for six hours per night, giving enough battery charge to run each lift for a full workday (two shifts). The forklift charging station draws AC power from the utility grid, converts it to DC power in the forklift battery, and the forklift inverter converts the power back into AC for the lift to use.

Conclusion

"In the early phases of planning a project, it is often difficult for clients to focus on the life-cycle costs of the building rather than the initial construction costs," concludes Simonson. "Merryvale Vineyards came to BAR Architects with long-term sustainability goals for this facility. We were able to consider every aspect — the environment, the energy efficiency and performance, and the long-term maintenance. It's the best possible approach a winery can make." ■

Table: Differences between fuel and electric-powered forklifts

Internal Combustion (fueled) forklifts	Electric forklifts
Can be refueled by adding a tank	Need to be charged or have a battery swap (may require a standby battery)
Can run in the rain	May have issues with rain (short-outs)
Faster	Not as fast (with the exception of the Jungheinrich)
Can run off-road	Prefer finished surfaces (with the exception of the Jungheinrich, which has semi-pneumatic tires)
Produce heat (dangerous to temperature-sensitive wine rooms)	Produce little or no heat
Produce fumes, smells, targeted by watchdogs for emissions issues	Produce little or no fumes
Longer truck bodies, require wider turning aisles	Smaller and require less working space
Maintenance includes oil and filter changes, tune-ups	Lower maintenance costs

CALENDAR

February 17–19
Winery Establishment Conference
Benton Harbor, MI

Looking to start a winery, and curious about what is involved? Starting a winery takes preparation and planning. The 2009 Winery Establishment Conference to be held at the Jordan Tatter Conference Center in the Southwest Michigan Research and Extension Center (SWMREC), Benton Harbor, MI, can help potential winery owners.

"In Michigan, the wine industry has grown steadily for the past 30 years," says Tom Zabadal, conference coordinator and grape specialist at Michigan State University (MSU). "Wine grape vineyard acreage is increasing in Michigan and the entire midwest. More people are interested in starting wineries. This conference is for those people who see themselves starting a winery within the next few years, in Michigan or other midwest states."

Speakers include:

- Bruce Zoecklein, professor / enology extension specialist, Virginia Polytechnic Institute, Blacksburg, VA.
- Michael Shaps, winemaker / partner in Virginia Wineworks, and winery start-up consultant.
- Lisa Van de Water, consultant on microbiology and wine quality through The Vinotec Group.
- Linda Jones, Michigan Grape & Wine Industry Council.
- Ellen M. Butz, Vintage Winery Consultants, Bloomington, Ind.
- Doug Welsch, owner / winemaker at Fenn Valley Winery, Fennville, MI.
- Thomas Zabadal, professor of horticulture.
- Paolo Sabbatini, assistant professor of horticulture / grape specialist at MSU, East Lansing, MI.
- Gerald White, professor emeritus of applied economics and management at Cornell University, Ithaca, NY.

Registration closes February 6. More information is available at www.grapes.msu.edu website, or contact Diane Dings at SWMREC at 269-944-1477 x 203, or dingsd@msu.edu.

Chardonnay grapes feed onto receiving hopper and incline conveyor to load into pneumatic membrane press.

GLORIA FERRER

Efficient, gentle, press loading

Gloria Ferrer's press pad is highly functional and efficient. The 2006 construction at the Sonoma, CA winery is a culmination of well-thought-out design, engineering, fabrication, and installation. The process began with development of the initial design concept by Bob Iantosca (winemaker) and Stephen Koster (winery process consultant), who collaborated on developing key design elements of a semicircular press layout, a gentle delivery system, a functional workspace, and a visually attractive system.

P&L Specialties (Santa Rosa, CA), developed the design elements into a finished design, fabricated the equipment, and installed the components. The collaborative involvement of Iantosca and P&L Specialties staff ensured the original design elements and philosophy were met and maximized where possible to produce a system that met and exceeded the original concepts.

The delivery system consists of an oscillating grape-receiving hopper, an automated movable main delivery conveyor, an automated bifurcated distribution chute feeding the pneumatic grape presses, and necessary support and work platforms. The cast-in-slab waste removal 18-inch diameter waste removal augers are stainless steel.

The oscillating grape-receiving hopper gently meters the fruit onto the main conveyor and provides an inspection station for the winemaking team to sort grapes at the single cluster level. The oscillating action of the hopper delivers very gentle conveyance to prevent fruit damage.

The automated movable main delivery conveyor moves to three selectable grape-press filling positions and one wash-out station. The conveyor features a proprietary sealed sump design to convey juice up the belt, a special formulated belting material for longevity with a specially designed belt cleat for gentle product conveyance, an internal drum motor pulley for infinite speed control and reliability, a clean-in-place system for sanitation, and motorized position movement.

The automated bifurcated distribution chute allows selection of either or both press doors to be filled, which allows the operator to precisely control filling of the press. This minimizes the "rolling" of the press to completely fill the press with fruit. Gentle and quick filling of the press is achieved that maximizes its utilization by reducing the overall filling/pressing cycle.

The pneumatic membrane grape presses include two Diemme 150hl units, and one Willmes TP12-14.

The aluminum work platform provides a spacious, functional work area with an unobstructed view of the grape processing equipment to allow the operating team to see what is happening and achieve the most efficient work flow. ■

JANUARY/FEBRUARY 2009

PRACTICAL PW WINERY & VINEYARD SHOWCASE

WINERY EQUIPMENT

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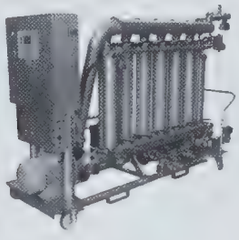
Gusmer Enterprises

Gusmer Enterprises represents Bucher Vaslin cross-flow filters to the U.S. wine industry. There is an appropriate size Bucher Vaslin cross-flow filter for every winery and budget. Bucher's FX filters range in flow rate from 100 to 11,000 gallons per hour.



The Bucher Vaslin cross-flow design utilizes a low filtration differential pressure (maximum 1.2 bar) and operates with essentially no increase in wine temperature. An automatic backflush system maintains an optimum flow rate. This system eliminates the handling concerns and need for disposal of loose filtration media. The units are fully automated and can operate around the clock without direct operator supervision.

Evaluate a Bucher Vaslin filter at your facility with a demonstration unit. Full-time cross-flow technical staff is available for demonstrations, training, and service calls. Contact a Gusmer Enterprises representative for more details.

Gusmer Enterprises, Inc.

For more information contact:
Gusmer Enterprises
Kathy Bollack, Dave Gusmer, Bill Merz, Tim Ossun, Rodger Pachelbel, Lauren Sloan, Ken Stewart
81 M Street, Fresno, CA 93721
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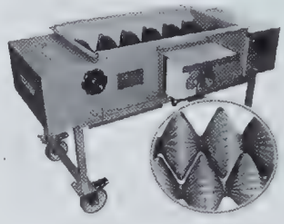
e-mail: sales@gusmerenterprises.com
website: www.gusmerenterprises.com

PLEASE SEE GUSMER ENTERPRISES AD, PAGE 10.

P&L Specialties

P&L Specialties is the exclusive representative of Demoisy products in the U.S. Demoisy is an industry leader in destemmer innovation and performance. The Demoisy line includes a unique stand-alone crush-roller unit that features soft rubber cones for gentle opening of berries (not crushing). P&L can integrate Mohno progressive cavity pumps, and vibrating separation tables to a crush system with Demoisy products.



The new 2009 picking-lug washing machine is very affordable, constructed of stainless steel components with a solids collection system for ultra-efficient water use.

The Le Trieur™ (LT) — patent pending — MOG separator leads the industry in innovative functionality. The 2008 model features interchangeable separation screens allowing accurate control of MOG separation, making the LT™ an ideal choice for wineries processing different red varieties, and seeking fine separation control.

P&L Specialties distributes Sutter pneumatic membrane presses, recognized as premier products delivering excellent results. Innovative design provides precise pressing control, easy operation, and world-class Swiss reliability. Available in open-slotted or closed tank configurations (10 hL to 150 hL capacity), these presses are competitively priced, and backed with excellent service.

P&L Specialties offers "ounce of prevention" pre- and post-harvest service for the P&L Specialties, Sutter, CME, and Demoisy equipment. Also offering expert crush pad and cellar design, development, and engineering services. Please call early to obtain the best results.

For more information, contact:
P&L Specialties
1650 Almar Pkwy., Santa Rosa, CA 95403
tel: 707/573-3141; fax: 707/573-3140
e-mail: sales@pnlspecialties.com
website: www.pnlspecialties.com

PLEASE SEE P&L SPECIALTIES AD, PAGE 85.

Gamajet Cleaning Systems

For more than 50 years, Gamajet has listened to customers, and developed a wide range of cleaning machines that advance the technology of cleaning winery tanks and barrels, while easing the cleaning burden of wineries throughout the world.

Responding to the need for effective tank cleaning, Gamajet developed the fluid-driven Gamajet 4, Gamajet 8, and Gamajet 9 machines, which provide powerful wash streams at low pressure. Tanks as tall as 50-feet can be easily cleaned, either from the top or from the bottom.

For better barrel cleaning, Gamajet has developed the HD Barrel Blaster, which features heavy-duty construction and a redesigned shape for smooth insertion. It is the strongest, most durable barrel cleaner ever made, lasting three times longer than previous machines.

For in-place barrel cleaning, the new All-In-One Flex combines impingement cleaning with vacuum extraction for easy cleaning and emptying of stacked or racked barrels.

The Evacu-Blast system includes a high-pressure pump, an All-In-One, and a vacuum pump — everything needed for in-place barrel cleaning. The Evacu-Blast HW mounts a hot-water-pressure washer to supply heated cleaning solutions.

All Gamajet winery cleaning machines and systems are included in Gamajet's new video presentation. Free copies are available upon request in either CD or DVD formats.

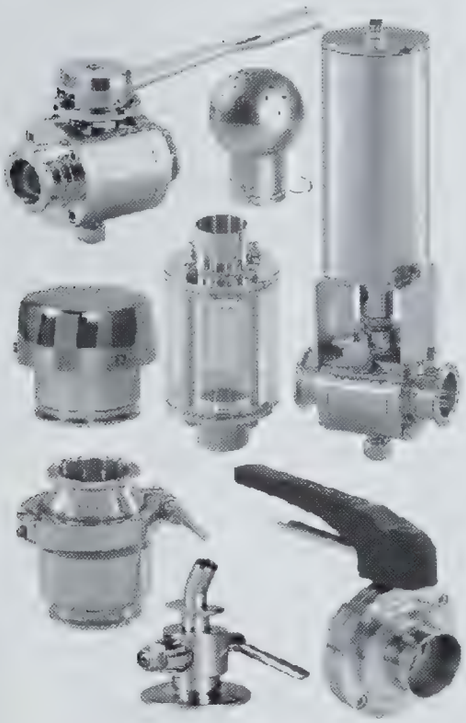
For more information, contact:
Gamajet Cleaning Systems
604 Jeffers Circle, Exton, PA 19341
tel: 877/426-2538; fax: 610/408-9945
e-mail: sales@gamajet.com
website: www.gamajet.com

PLEASE SEE GAMAJET AD, PAGE 132.

Cipriani Harrison Valves Corp.

Cipriani Harrison Valves Corporation manufactures a large variety of high-quality hygienic-forged stainless steel valves, in 304L and 316L, both manual and actuated.

Cipriani also makes filters in 1-inch to 4-inch. Many valves are AAA-approved, and third-party verified. Cipriani is ISO-certified, and its products are fully traceable. MTR's are available on request.



Cipriani can supply products compliant with FDA and USP class-6. BPE and low-ferrite products are also available. To receive a catalog, call or visit the Cipriani website.

For more information, contact:
Cipriani Harrison Valves Corp.
30271 Tomas St.
Rancho Santa Margarita, CA 92688
tel: 949/589-3978; fax: 949/589-3979
e-mail: cipriani@ciprianicorp.com
website: www.ciprianicorp.com

PLEASE SEE CIPRIANI HARRISON AD, PAGE 23.

Vibrac LLC

With almost 50 years as an industry leader in the field of torque measurement, Vibrac offers the Torqo II system. The system's ROPP test is an excellent application for wine bottling that is designed to measure the torque required to open, break the bridges, and then strip the threads on a Roll-On Pilfer Proof cap.

The Torqo II provides accurate, reliable information that allows you to track capping performance and predict potential problems before they occur. A Windows® touch screen user interface makes torque testing very simple, accurate, and affordable. The testing process eliminates variable results typically caused by manual recording errors, operator disparities, and testing procedure differences.

With data provided by the Torqo II, a user can rapidly identify problems and make adjustments to eliminate unnecessary expenses caused by capping defects, leaking bottles, and potential rejected shipments.

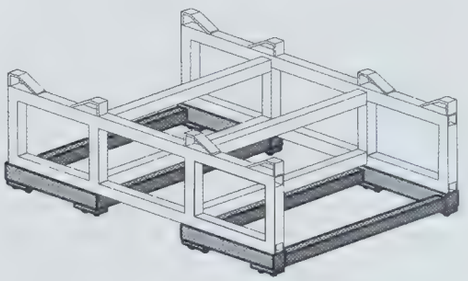
The Torqo II can produce a summary report of the data stored in memory that includes the low, average, and high range, and standard deviation. The Torqo II also displays a live torque curve while a cap is being tested, allowing an operator to view a complete graph for each cap, not just the maximum torque value.

For more information, contact:
Vibrac LLC
16 Columbia Dr., Amherst, NH 03031
tel: 603/882-6777; fax: 603/886-3857
e-mail: sales@vibrac.com
website: www.vibrac.com

PLEASE SEE VIBRAC AD, PAGE 48.

Western Square Industries

Western Square Industries will develop, patent, manufacture, distribute, and sell a Seismic Support System for wine barrel pallets in 2009 (Patent filing October 15, 2008). Western Square has signed an exclusive worldwide 12-year contract with Charles Chadwell, Assistant Structural Engineering Professor at Cal Poly, San Luis Obispo.



The modified barrel stacking rack assembly system will attach to the bottom rack. The base uses ball bearings to allow barrel racks to slide rather than sway (and topple) during a quake.

The Seismic Support System will improve winery warehouse safety during an earthquake. "It will provide owners, operations managers, winemakers, and cellar workers peace of mind day and night," says Mark Canepa, Western Square's winery products sales manager.

In three years of testing on the Cal Poly shake table by Chadwell and his team, the only visible movement was forward and backward sliding. Chadwell's development can potentially save wineries millions of dollars in damage and loss if an earthquake occurs.

"Western Square Industries is doing everything possible to have the Seismic Support System available for sale by February 2009," company president Trygve Mikkelsen reports.

For more information, contact:
Western Square Industries
Trygve Mikkelsen
1621 N. Broadway, Stockton, CA 95205
tel: 209/944-0921; toll-free: 800/367-8383
website: www.westernsquare.com

PLEASE SEE WESTERN SQUARE AD, PAGE 51.

Scott Laboratories, Inc.

Continued innovation by Scott Labs and Vaucher-Beguet has resulted in increased economy and efficiency of sorting during crush. Mistral introduces the addition of the "New Generation" to its Mistral line of equipment for the wine industry. The Mistral 100 NG features an improved design that combines its de-juicing table and Mistral 100 sorting unit onto one robust, unified chassis. This reconfigured design provides a smaller footprint, with better flexibility and ease of transport and setup. With two fewer motors, the Mistral 100 NG boasts enhanced efficiency and performance over its predecessor. Winemakers already using this technology have found that not only has overall must and wine quality improved, but that the simplicity and flexibility of use has also led to economic efficiencies in labor and time.

The increased practice of sorting has led to greater scrutiny of destemmers and their ability to provide whole berries. The new Armbruster Rotovib has proven to be a significant advance in enhancing berry sorting. Field trials and feedback from Rotovib owners have strengthened Armbruster's ability and reputation for providing higher percentages of whole berries, compared to other units processing the same fruit. This has allowed winemakers to consider berry selection on a wider variety of fruit, including more thin-skinned varieties.

For more information, contact:
Scott Laboratories, Inc.
2220 Pine View Way, Petaluma, CA 94954
tel: 707/765-6666; fax: 707/765-6674
e-mail: info@scottlab.com
website: www.scottlab.com

PLEASE SEE SCOTT LABS AD, PAGE 64.

Oenodev USA/Vivelys Group

Oenodev invented micro-oxygenation (MOx) in the late 1980s in southern France, to control tannin development, increase color stability, combate reduction and vegetative characteristics, and increase wine longevity. Oenodev understands that oxygenation is only one aspect of an overall plan for élevage and control of a wine's structure, aging, and color through its interactions with oxygen, oak, and lees. Through decades of experience and extensive R&D, Oenodev's equipment is constantly evolving to be a user-friendly, fully integrated part of winery operations.

Thousands of micro-oxygenation units by Oenodev have been installed worldwide. With a team of trained enologists around the world, Oenodev has become a leader in building and applying state-of-the-art micro-oxygenation equipment, from a single tank application to multiple-tank applications.

Oenodev units include a precision ceramic diffuser, which assures a wide range of exact, continuous-flow measurements, from 0.25 ml/l/mo to 200 ml/l/mo, for tanks from 25 gallons to 150,000 gallons or more. Units have reliable and stable back-pressure. Measurement of O_2 can be expressed in either ml or mg.

Many MOx users take advantage of Oenodev's full-service support packages, which provide affordable on-site expertise to assure best results and minimize risk.

For more information contact:
Oenodev USA/Vivelys Group
1260 N. Dutton Ave. #240
Santa Rosa, CA 95401
tel: 707/332-1078; fax: 707/542-6364
e-mail: usa@Oenodev.com
website: www.Oenodev.com

PLEASE SEE OENODEV USA AD, PAGE 75.

Fogmaster Corporation

Fogmaster's Sentinel-5850 barrel-room humidification system brings innovative atomization technology to small- and mid-size wineries. It uses a turbulent-vortex nozzle to atomize water into micro-droplets that evaporate quickly and spread uniformly throughout the barrel room.

The control unit (see photo) monitors relative humidity and regulates water flow. A regenerative blower, designed for efficiency and low-maintenance cost, provides air to atomize water.

When humidity drops below the set point, the control unit activates the system and the nozzle ejects a fog of tiny droplets. The droplets evaporate quickly and raise humidity so barrels stay dry. Because the nozzle has no tiny orifices, nozzle plugging is not an issue.

Designed for "do-it-yourself" installation, the Sentinel-5850 includes all installation components except the two-inch PVC pipe needed to convey air from the blower to the nozzle.

A single nozzle system can maintain a 5,000-sq.ft. barrel room. A cart option is available for user mobility.

For more information, contact:
Fogmaster Corporation
1051 SW 30th Ave.
Deerfield Beach, FL 33442
tel: 954/481-9975; fax: 954/480-8563
e-mail: info@fogmaster.com
website: www.fogmaster.com

PLEASE SEE FOGMASTER CORP. AD, PAGE 100.

PRACTICAL WINERY & VINEYARD

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Nicholas, Margarey, Watchel
Dept. of Primary Industries & Resources, South Australia **106pp—$40**

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Magarey, MacGregor, Wachtel, & Kelly
Sturdy, laminated, pocket-sized guide containing more than 350 color photos with short, easily-read descriptions of most diseases, pests, and disorders found in vineyards. **107pp—$30**

Flowering and Fruitset in Grapevines
Peter May
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Illustrated Guide to Microbes and Sediments in Wine, Beer and Juice
Dr. Charles G. Edwards
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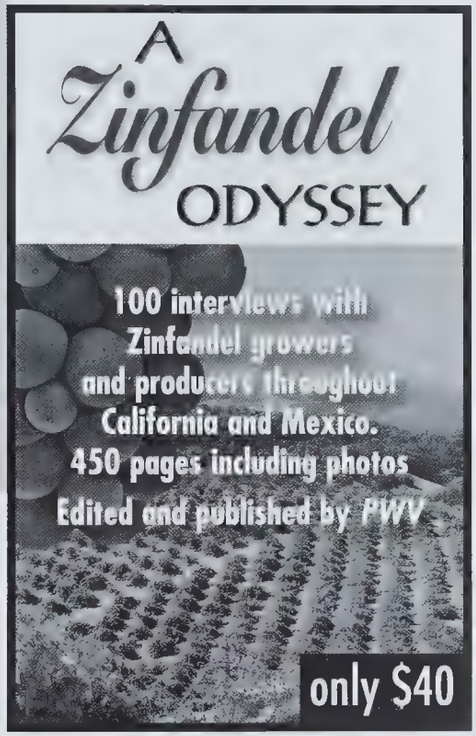
M.R. Dharmadhikari & K.L. Wilker
A practical guide for home winemakers, commercial small-scale producers, and large wineries making small, experimental lots of table wine. **120pp—$36**



Precision Viticulture
T. Proffitt, R. Bramley, D. Lamb, E. Winter
A range of tools and technologies for vineyard management with practical applications and commercial case studies. **90pp—$44**

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P. Nicholas
Describe vineyard soil types, how to manage soil treatments, cover crops, and herbicides, optimize water quality, irrigation systems. Nutrient deficiencies and toxicities, how to manage nutritional requirements.
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R. Smart & M. Robinson
Canopy management and economics, improvement of canopy microclimates, importance of winegrape canopies, construction of trellis systems. **88pp—$40**

Taming the SCREW: A manual for winemaking with screwcaps Tyson Stelzer
Detailed technical discussion of screwcaps and the bottle, reasons for choosing screwcaps, winemaking procedures, chemistry, bottling, capping, handling, storage, and ageing. **305pp—$90**

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E. Winter, J. Whiting, J. Rousseau
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L. Thach, J. Olsen, & Paul Wagner
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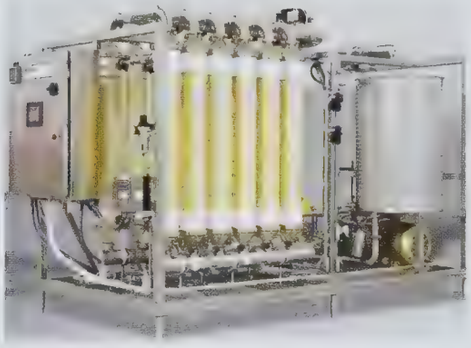
Koch Membrane Systems

Koch Membrane Systems, Inc. (KMS) introduced hollow fiber crossflow microfiltration (CMF) systems designed specifically for use in wine clarification. The systems employ a new membrane that is sturdier and more productive than other membranes.



KMS Winefilter™ WF-12 crossflow microfiltration system.

With KMS crossflow filtration, a feed stream flows parallel to the membrane surface at high velocity, as compared to the perpendicular flow path employed in conventional depth filtration. By keeping suspended material from settling, crossflow filtration minimizes the build-up of solids on the membrane, delivering a high permeation rate and maintaining stable throughput. CMF can be employed as a one-step process, eliminating the need for multiple diatomaceous earth filtration steps.

KMS systems are flexible, efficient, and gentle on wine due to minimal oxygen pickup and heating. They are available as manual machines, partial, and fully automated systems requiring little or no operator attention.

For more information, contact:
Koch Membrane Systems
850 Main St., Wilmington, MA 01887
tel: 888/677-5624
e-mail: info@kochmembrane.com
website: www.kochmembrane.com

PLEASE SEE KOCH MEMBRANE SYSTEMS AD, PAGE 139.

ColloPack Solutions

ColloPack Solutions is a leading provider of bottling equipment and grape processing systems. ColloPack's premium line of bottling equipment, from single machines to complete integrated lines, includes the Bertolaso cleaner/filler/corker/capper bloc, Robino & Galandrino capsuling equipment, Cavagnino & Gatti PS and wet glue labelers, Francesca pumps, CIVision inspection systems, and Bertolaso automated conveying systems.

ColloPack provides engineering, project management, installation of equipment, and comprehensive after-sales service, including a large inventory of replacement parts, equipment repair, training and maintenance programs customized to each winery's needs.

Diemme, the leading manufacturer of grape presses and grape conveyors, is also represented by ColloPack. Diemme's product line includes Kappa destemmer/crushers (5 to 90 tons per hr.); Kappa grape sorting and conveying systems, including belt and vibrating conveyors and belt elevators; Membrane presses (1,500 to 43,000 liter capacity); Vintage basket presses (1,200 to 2,300 liter capacity); and Enotork continuous presses (600 to 1,200 mm diameter).

For more information, contact:
ColloPack Solutions
Dave Means, Phil Giacalone, Rick White, Joe Mironicki, Tom Kennedy, Craig Richardson, or Greg Fulford
193 Camino Dorado, Napa, CA 94558
tel: 707/258-3940; fax: 707/258-3949
e-mail: sales@collopack.com
website: www.collopack.com

PLEASE SEE COLLOPACK SOLUTIONS AD, PAGE 35.

Santa Rosa Stainless Steel

Santa Rosa Stainless Steel (SRSS), one of the world's largest wine tank manufacturers, is in its 41st year of production.

SRSS builds tanks with capacities from one-gallon up to 700,000-gallon field-erected tanks. Each tank is finely crafted and passes through a rigid series of quality control checkpoints before shipment. Tanks are available on short notice from stock or may be custom-built to winery specifications.

Cooling jackets or panels can easily be added to existing tanks. SRSS press-dimple jackets can be installed in the winery, retrofitting existing non-jacketed tanks for increased efficiency.

Jobsite retrofitting and tank repair are a large part of SRSS expertise. In 2001, SRSS released a state-of-the-art, automatic punch-down unit that is installed in the tank and operated by an air cylinder above the tank. The automatic control system is manufactured by Green Controls of Cloverdale, CA. Five units were installed at Carneros Creek Winery for the 2001 harvest.

SRSS can design and build tanks or convert existing tanks for micro-oxygenation.

For more information contact:
Santa Rosa Stainless Steel
1400 Airport Blvd., Santa Rosa, CA 95403
tel: 707/544-7777; fax: 707/544-6316
e-mail: rod@srss.com
website: www.srss.com

PLEASE SEE SRSS AD, PAGE 83.

Euro-Machines, Inc.

As a leading supplier to North American wineries, Euro-Machines will be broadening its product range in 2009, with new equipment including custom-made tanks and conveyors.

All-stainless steel tanks (open top, multi-chamber, and storage), are specifically manufactured for Euro-Machines, and available from 25 to 25,000 gallons.

New conveyor belts will be manufactured specifically for Euro-Machines by Scharfenberger Company of Germany. Standard features include:

- Open construction for easy cleaning;
- All stainless steel;
- Variable frequency drive for gentle moving, motor mounted on top for better leverage;
- Conclave belt cleats.

Customization is possible with individual sizes available, different hopper sizes, and much more.

After moving to a new facility in Fairfield, CA, which has doubled its usable space, Euro-Machines presents a new corporate identity, including a new logo.

Euro-Machines, the U.S. subsidiary of Scharfenberger Company of Germany, is committed to excellent customer service. Warehouses and service vehicles are fully stocked with spare parts so that Euro-Machines' knowledgeable and highly-trained technicians may provide timely service to customers.

For more information, contact:
Euro-Machines, Inc.
497 Edison Ct., Ste. G, Fairfield, CA 94534
tel: 707/864-5800; fax: 707/864-5879
e-mail: info@euromachinesusa.com
website: www.euromachinesusa.com

PLEASE SEE EURO-MACHINES AD, PAGE 37.

Jaybird Manufacturing, Inc.

Jaybird manufactures a commercial line of fine-mist fogging units, perfectly suited for wine storage humidification. With three major product lines to choose from, Jaybird has units to suit any size barrel room. From durable mobile floor units to hanging fan units, Jaybird brings all the advantages of high-tech fogging down to simple stand-alone independent units.

Enormously powerful and attractively priced, Aquafog® humidifying fans do not require high-pressure pumps or massive air supplies for operation. The nozzle-free units connect and operate from ordinary utility supplies and have fully adjustable fogging output capability.

- **HRSm™** Compact, powerful, and built like a tank, with pivoting fogging head that can deliver high quality fog anywhere you need it;
- **Turbo XE fans™** have all the power with added versatility and minimal investment. Humidifies up to 40,000 cu. ft.;
- **Aquafog® Hydro SS-700™** brings advanced fine-mist fogging to the small winery, with quiet hanging units for areas up to 3,000 cu. ft.

Discover the practical way to humidify your barrel rooms with Aquafog®, the industry leader in centrifugal atomizers for over 19 years. Made in the U.S.A.

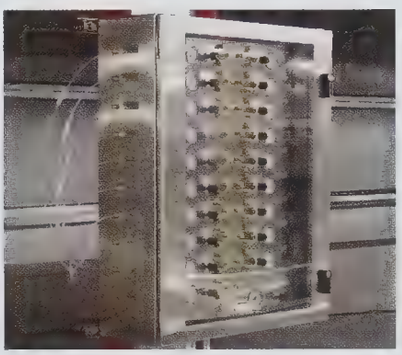
For more information, contact:
Jaybird Manufacturing, Inc.
2595-B Clyde Ave., State College, PA 16801
tel: 888/889-4407; fax: 814/235-1827
e-mail: info@jaybird-mfg.com
website: www.jaybird-mfg.com

PLEASE SEE JAYBIRD MFG. AD, PAGE 40.

Westec Tank & Equipment

Westec Tank & Equipment has 25 years of industry-leading technology and experience providing custom tanks, catwalks, and equipment for the wine and beverage industries. For a large wine consortium or a small, boutique startup winery, Westec offers one-on-one expertise and insight from helpful, knowledgeable, and experienced professionals.

Westec is on the forefront of the newest styles and designs. The equipment is as technologically-advanced, well-built, easy-to-maintain, safe, and aesthetically-appealing as possible. For wineries needing design advice and guidance, Westec can help plan winery enhancement and expansion projects.



The Westec "OxBox" lets winemakers control the micro-oxygenation process. to enhance wines without oak barrels — a cost-cutting opportunity.

- Standard 4-channel and 8-channel units (optional stainless steel mounting brackets);
- Custom units designed to meet winery needs;
- Installation and service.

Contact Westec today for more information, a tour of the manufacturing facility, and an estimate for your winery's next job.

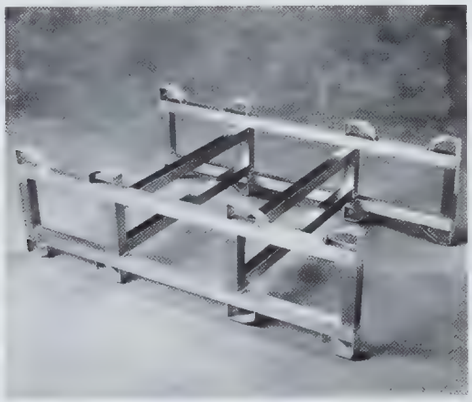
For more information, contact:
Westec Tank & Equipment
Joe Belli, Jim Belli, Mark McDowell
1402 Grove St., Healdsburg, CA 95448
tel: 707/431-9342; fax: 707/431-8809
e-mail: info@westectank.com
website: www.westectank.com

PLEASE SEE WESTEC TANK AD, PAGE 91.

G.W. Kent, inc.

G.W. Kent has supplied wineries, breweries, and beverage industries since 1985. The company has a catalog and an online store with a full line of winery equipment and supply needs, including:

- destemming, crushing, and sorting equipment;
- refractometers and other testing instruments;
- bins;
- presses;
- tanks;
- valves;
- fittings;
- filters;
- pumps;
- gauges;
- corkers and fillers;
- corks;
- capsuling and labeling machines and more!



G.W. Kent stainless steel barrel racks have replaced many rusty metal barrel racks in wineries all over the U.S. In addition to offering racks that outshine the competition, G.W. Kent offers competitive prices and quick delivery from stock, or custom production. By reducing winery labor and maintenance costs, stainless steel racks are an investment that pays for itself in less than three years.

Shop for racks and much more. Order a catalog or shop online at gwkent.com.

For more information, contact:
G.W. Kent, Inc.
506 S. Huron, Ypsilanti, MI 48197
tel: 800/333-4288, or 734/572-1300
e-mail: info@gwkent.com
website: www.gwkent.com

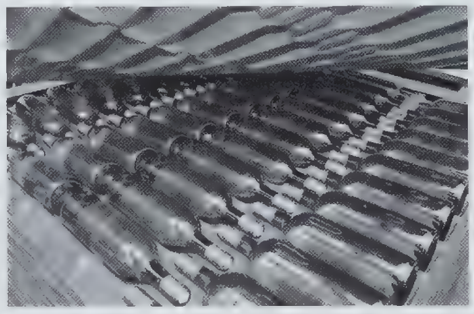
PLEASE SEE G.W. KENT AD, PAGE 86.

Spec Trellising

Cella-Stac is a palletized, modular system for storing bottled wine. Cella-Stac is comprised of layers of thermoformed, food-grade plastic sheets, between which finished bottles of wine are safely stored. Cella-Stac 48CS accommodates 48 bottles per layer and works with most bottle types. Alternative sizes will be available in the near future.

Because of the individual bottle cavities, there is no bottle-to-bottle contact, so breakage is less than with traditional bottle storage techniques, with good airflow between bottles. As each tray is filled, a new layer is placed on top, until the pallet is complete.

Cella-Stac CS48 can safely contain up to 14 layers (672 bottles) and stacked up to three pallets (2,016 bottles) high. Cella-Stac has a life expectancy of up to 15 years.



Cella-Stac offers wineries convenience and logistical benefits including:

- Occupational health and safety benefits;
- Reduced handling costs;
- Reduced BVS closure damage and bottle scuffing;
- Improved inventory control;
- Greater use of warehouse space.

For more information, contact:
Spec Trellising
39 Indian Drive, Ivyland, PA 18974
tel: 800/237-4594; 215/322-5588
fax: 215/357-3122
e-mail: info@spectrellising.com
website: www.spectrellising.com

PLEASE SEE SPEC TRELLISING AD, PAGE 73.

Pro Refrigeration inc.

Pro Refrigeration is a leading manufacturer and supplier of refrigeration equipment to the winery and brewing industries. Pro provides free load calculations to determine the right size chiller system to handle current and future winemaking requirements.

Pro's mission to build high quality, reliable, and energy-efficient chiller systems requires constant product development, combining the latest technology with proven design and engineering.

Recent developments include:

- Remote web-based monitoring of chiller systems through the RGX control card, allowing monitoring and system control from anywhere;
- Continued improvement of the CR110 microprocessor controller, providing for smooth and efficient system operation;
- Intuitive touch-screen microprocessor interface for easier set up, programming, and monitoring;
- Upgrade from formed metal frames to heavy-duty welded framework;
- Variable frequency drives for glycol pump and compressor control, decreasing power consumption and compressor cycling.

Much more than a manufacturer of equipment for large wineries, Pro's focus remains on the proven MA Chiller Series, which ranges from 3 HP up to 24 HP.

Over the past 18 years, Pro has worked with some of the finest winemakers to develop a product line specifically for the winemaking craft.

For more information, contact:
Pro Refrigeration Inc.
326 8th St. SW, Auburn, WA 98001
tel: 253/735-9466; toll-free: 800/845-7781
fax: 253/735-2631
e-mail: info@prorefrigeration.com
website: www.prochiller.com

PLEASE SEE PRO REFRIGERATION AD, PAGE 84.

ARS/Pressure Washer Company

A leader in steam sanitization and sterilization equipment, ARS announces the release of the second generation SWASH™ portable steam generator. The redesigned cabinet provides greater access for scheduled maintenance, and features holders for the steam gun, barrel wand, and hose. Improved wheels provide greater maneuverability.

New for 2009 is the Miele G7859-W dishwasher, configured for washing tasting room wine glasses. These units remove lipstick, dry the glasses, and are extraordinarily quiet.

Expanding its line of sanitization and sterilization equipment, ARS offers the ClearWater Tech line of ozone generators for wineries. This effective technology from one of the leading suppliers of ozone generators to the bottled water industry, is available through ARS/PWC.

The ARS/PWC line of pressure washers has also been extended with the addition of six new models designed specifically for winery applications. All-electric, diesel-fired, or propane-fired units are configured to meet the specific needs of a winery.

The ARS showroom is open by appointment. Call and they will demonstrate that "We work well under pressure."

For more information contact:

ARS/Pressure Washer Company
1184 Maple Lane, Calistoga, CA 94515
tel: 707/942-8330; fax: 707/942-8337
e-mail: info@arsenterprises.com
website: www.cleanwinery.com

PLEASE SEE ARS ENTERPRISES AD, PAGE 28.

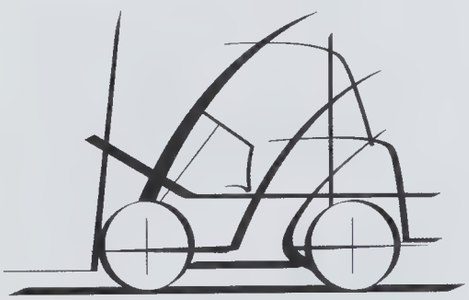
Accurate Forklift Inc.

Accurate Forklift has been serving winery customers in California's Napa, Sonoma, Lake, Marin, and Solano counties for more than 30 years. Accurate Forklift provides new Nissan and Jungheinrich forklifts, used equipment of all brands, warehouse equipment, service on all lifts, and rental lifts and attachments.

With extensive winery operations experience, Accurate Forklift also provides technical assistance in the planning of wineries and warehouses.

Jungheinrich electric forklifts represent the highest quality with no compromises. These lifts are known for long run times, rugged components, hill climbing abilities, and 1,000-hour maintenance intervals.

Nissan forklifts provide solutions across a broad product range. Nissan offers internal combustion and electric forklifts. The Nissan motor already passes the 2010 CARB requirements for exhaust emissions, while providing the best fuel economy of any forklift offered in California.



Accurate Forklift's best asset is a staff of "Lift Truck Professionals," committed to quality work and ethical standards, whose most satisfying challenge is bringing in new customers, and giving them the personal attention and quality products they deserve.

For more information, contact:

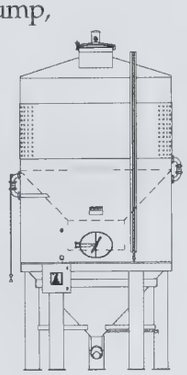
Accurate Forklift, Inc.
85 Scenic Ave., Santa Rosa, CA 95407
tel: 707/585-3675; fax: 707/585-9734
e-mail: smchenry@accurateforklift.com
website: www.accurateforklift.com

PLEASE SEE ACCURATE FORKLIFT AD, PAGE 53.

Criveller Group

Criveller Group has supplied the wine and beverage industries for over 25 years. The Healdsburg, CA, office expedites customer service for wineries in California, Oregon, and surrounding western states.

The new-concept Ganimede® fermentor utilizes the energy (CO_2) generated during fermentation, instead of a mechanical device or pump, to flood and leach grape marc. Wineries in California, Italy, France, Australia, and Canada are already employing this technology. Available in various sizes, the Ganimede fermentor has great design, is easy to use, and very affordable.



Criveller carries a wide variety of processing equipment for every winemaking phase, and fabricates stainless steel tanks to customer specifications. Red wine fermentors with a mobile plunger are available.

In conjunction with leading manufacturers of bottling and labeling equipment, Criveller offers manual, semi-automatic, or fully automatic bottling lines, including cost-effective monoblocs and triblocs that cater to all bottling needs

Criveller's warehouses in Niagara Falls, Canada, and Healdsburg, CA, stock various models of bottling equipment, filters, destemmer/crushers, presses, and stainless steel tanks, including variable capacity and mini-tanks, for customer inspection.

For more information, contact:

Criveller Group
West Coast
185 Grant Ave., Healdsburg, CA 95448-9539
tel: 707/431-2211; fax: 707/431-2216
e-mail: crivca@sonic.net
website: www.criveller.com
Canada
6935 Oakwood Dr., Niagara Falls
Ontario L2E 6S5
tel: 905/357-2930; fax: 905/374-2930
e-mail: info@criveller.com
East Coast
Box 202, 1623 Military Rd.
Niagara Falls, NY 14304-1745
tel: 905/358-5202

PLEASE SEE CRIVELLER GROUP AD, PAGE 47.

KLR Machines, Inc.

KLR Machines' complete line of Bucher Vaslin equipment is developed by expert factory technicians, designed to work in-line from grape reception through processing. As a subsidiary of Bucher Vaslin, KLR Machines is able to respond to the needs of the wine industry with both new technologies and innovation. A variety of equipment capacities, allows KLR to accommodate small, medium, and large wineries alike.

The newest line of presses being introduced for 2009 is the Bucher XPlus line. The Xplus line encompasses the Bucher 22 HL to 40 HL capacity range and is an extension of Bucher Vaslin's proprietal software ORTAL™. ORGAN™ software is available on all Bucher XPlus models.

The new generation Delta destemmer, redesigned to include a variable frequency drive and a high-density polyethylene cage, offers high quality destemming and has more features available to accommodate vintage variations and grape varieties.

KLR Machines, Inc.
a **BUCHER** company

KLR Machines announces its newest distribution partner, Vance Metal Fabricators in Geneva, NY. KLR continues partnerships with Pacific Winemaking (Pacific Northwest) and Carolina Wine Supply (Southeastern U.S.). KLR and its distribution partners can be contacted through klrmachines.com, or by calling 707-823-2883.

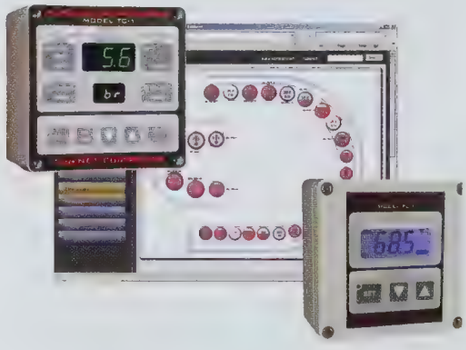
For further information, contact:
KLR Machines, Inc.
350 Morris St., Ste. E, Sebastopol, CA 94572
tel: 707/823-2883: fax; 707/823-6954
website: www.klrmachines.com

PLEASE SEE KLR MACHINES AD, PAGE 81.

Acrolon Technologies, Inc.

Acrolon, an industry leader in temperature control, offers two versions of its TankNET system.

TankNET® Professional offers a redesigned Web interface, enhanced functionality, and features such as presets, change auditing, tasting notes, and detailed fermentation reports. Also available is a scheduler for automating pump-overs and initiating other control changes and communications modules for connecting TankNET to wine-tracking software, industrial PLCs, and energy management systems.



TankNET® Lite is a scaled-down version of TankNET Pro that includes essential functionality for small wineries. This affordable product provides Web-browser monitoring and control of tank thermostats plus data logging, Brix/temp graphing, and e-mail alarms. TankNET Lite requires no network wiring, no Windows® server, and no software installation.

TC-1 Fermentation Controller: Offers calibration-free temperature control plus Brix and pump-over tracking and optional I/O modules for automated pump-overs, night-air cooling, chiller and dual-zone temperature control, and barrel-room humidification.

PL-1 Wire-Less Thermostat: A revolutionary temperature controller offering Brix and pump-over tracking, plus robust wire-less networking.

For more information, contact:
Acrolon Technologies, Inc.
19229 Sonoma Hwy., Sonoma, CA 95476
tel: 707/938-1300; fax: 707/938-1342
e-mail: ben@acrolon.com
website: www.acrolon.com

PLEASE SEE ACROLON TECHNOLOGIES AD, PAGE 53.

Emmendinger Maschinenbau GmbH

Emmendinger Maschinenbau (EMB) is a German machine engineering specialist for wine and sparkling wine capsule machines. During the machine construction, EMB focuses on individual customer requirements.

Based on the modular construction, the use of latest technology, and highly-dynamic servomotors, these capsule machines are producing worldwide in multiple shift operation, with high precision and without disturbances. This enables the production of shrink capsules and polylaminated capsules for wine bottles, poly-laminated capsules and aluminium capsules for sparkling wine bottles on a high-quality level and at high speed.

Because of the reliability and the high flexibility of these machines, EMB is proud to notice a steadily increasing number of customers.

For more information, contact:
Emmendinger Maschinenbau GmbH
Daniel Zibold and Michael Bennek
Am Elzdamm 32
D-79312 Emmendingen / Germany
tel: 0049 7641 9242 69; fax: 0049 7641 9242 67
e-mail: info@emmendinger.de
website: www.emmendinger.de

PLEASE SEE EMMENDINGER MASCHINENBAU AD, PAGE 78.

APCCO

Applied Process Cooling Corporation (APCCO) specializes in:

- Overall environmental system design and master planning;
- Retrofits and energy efficiency audits;
- Cooling, warming and humidification of barrel storage, caves and custom applications;
- Cooling of case good storage;
- Must chiller design and fabrication;
- Night air and CO_2 ventilation;
- Central and portable glycol warmers;
- Main Glycol distribution and tank piping;
- Controls — winery programmable logic controllers, and digital tank controllers;

APCCO brings experience, dedication to quality, and customer satisfaction to each winery project.

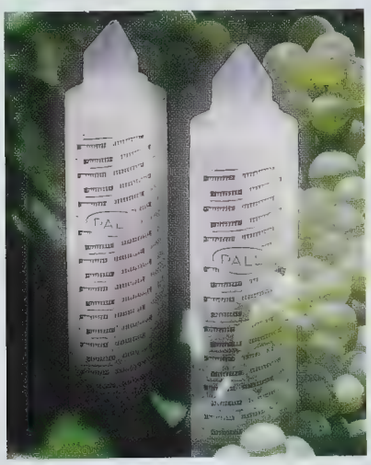
For more information, contact:
APCCO
1408 Grove St., Healdsburg, CA 95448
tel: 707/433-9471; fax: 707/431-0607
e-mail: mcasostibi@apcco.net
website: www.APCCO.net
PLEASE SEE APCCO AD, PAGE 18.

Pall Corporation

The Oenopure™ II filter cartridge is Pall Corporation's most recent and advanced solution for final membrane filtration of wine. The cartridge is constructed from polyethersulfone membrane, a highly resistant and inert media, to ensure a negligible level of organoleptic and colloidal interference. Additionally, the media is configured with Pall's unique and patented "laid over pleat" technology for increased mechanical strength, filter area and exposure to repeated hot water, steam and chemical sanitization cycles for longer service life.

Designed specifically for wine filtration, the Oenopure II is available in 0.45µ and 0.65µ, and validated with wine-specific microorganisms for consistent and reliable performance. The single open-ended filters are easily wet- and integrity-tested *in situ* in order to ensure effective microbial removal and assembly integrity.

With OenoFlow™ Wine Clarification systems, wineries can maintain high flow rates for maximum yield, while also reducing the costs associated with traditional technologies and subsequent filtration steps. Whether the system is used directly after fermentation, after cold stabilization, or prior to bottling, OenoFlow technology helps wineries set new standards for achieving brand quality, yield, and efficiency.



For more information, contact:
Pall Corporation
2200 Northern Blvd., East Hills, NY 11548
tel: 866/905-7255
e-mail: foodandbeverage@pall.com
website: www.pall.com/foodandbev
PLEASE SEE PALL CORP. AD, PAGE 67.

St. Patrick's of Texas

St. Patrick's supplies equipment for small to mid-size wineries from three warehouses (35,000 square feet) in Austin, TX. Product descriptions and pricing are available online at www.stpats.com. Equipment manuals are also available online.

St. Patrick's of Texas stocks the following equipment:

- NIKO pneumatic membrane presses;
- MEP semi-automatic corkers;
- MEP semi-automatic labelers;
- Wine tanks;
- EnoItalia crusher/destemmers;
- Sanitary valves and fittings;
- Barrel tools;
- Filling machines;
- Plate and frame filters;
- Membrane filters;
- Wine and must pumps;
- Heat-shrink and foil applicators.

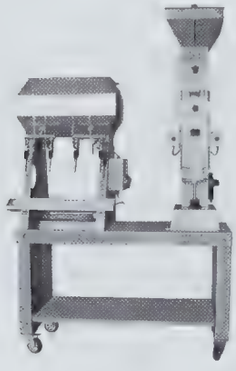
St.Patrick's of Texas

For more information, contact:
St. Patrick's of Texas
1828 Fleischer Dr., Austin, TX 78728
tel: 512/989-9727; fax: 512/989-8982
e-mail: stpats@bga.com
website: www.stpats.com
PLEASE SEE ST. PATRICK'S AD, PAGE 68.

Napa Fermentation Supplies

Napa Fermentation Supplies offers a full line of winemaking equipment and supplies, including variable capacity stainless steel tanks with adjustable lids from 26 gallons to 2,693 gallons and closed-top tanks from 79 gallons to 5,221 gallons, with or without manway, and with or without cooling.

Also available are: Karcher hot water pressure washers with 1,300 psi to 3,000 psi and temperatures from 86°F to 285°F steam; one-inch and 1.5-inch Jabsco pumps with AC inverter drive; two-inch or three-inch Zambelli must pumps with AC inverter drive; Zambelli crusher/destemmers from two to 14 tons per hour; Zambelli manual and hydraulic, membrane, and bladder presses; eight-inch and 16-inch Zambelli plate filters; a full line of stainless steel fittings and valves, butterfly and ball; one-inch to four-inch wine hose; labware; refractometers; wine thieves; and table-top labelers.



Tivoli corking/filling machine, made of AISI-304 stainless steel, has four jaws for use with synthetic or natural corks with 22, 24, or 26mm diameter. The corking pin has a pneumatic piston, inserting rapidly to create less pressure on bottleneck, and the cork hopper has mechanical agitator for continuous cork feed. The filler has high/low fill sensors, four spouts, comes with or without vacuum, 110 VAC, and will fill 500 to 600 bottles/hour.

For more information, contact:
Napa Fermentation Supplies
575 Third St., Bldg. A, Napa, CA 94559
tel: 707/255-6372; fax: 707/255-6462
website: www.napafermentation.com

PLEASE SEE NAPA FERMENTATION AD, PAGE 73.

Raynox 2000, inc.

Fabricating stainless steel tanks for the winery and agri-food sector is Raynox's core business.

From well-designed standard models, to carefully crafted custom tanks and on-site fabrication, Raynox has assisted North American wineries of all sizes. Raynox builds every tank sold, ensuring quality and craftsmanship meeting high standards. Raynox repeat customers especially value the post-sales service.

Raynox off-the-line standard tank models set an industry benchmark for red and white fermentation and storage tanks, with a variety of options to satisfy the most discerning winemaker. Custom fabrication expertise ensures Raynox can meet winemakers' exact needs, from a tank that fits the space, to a specialized dual fermentor.

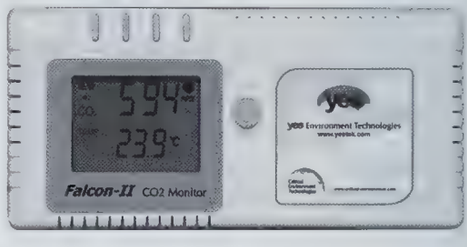
Raynox offers a wide range of winemaking equipment selected with the same care used to manufacture tanks. From the sorting table to final labeling, Raynox has equipment to help winemakers every step of the way.

For more information, contact:
Raynox 2000 Inc.
Sales Department
1148 St. Michel Street, St-Cesaire
Quebec, Canada J0L 1T0
tel: 866/469-4181 (toll free)
fax: 450/469-2112
e-mail: raynox@raynoxinc.com
website: www.raynoxinc.com

PLEASE SEE RAYNOX AD, PAGE 16.

Critical Environment Technologies

Critical Environment Technologies (CET) manufactures both handheld air quality monitors and fixed systems. Gases detected include CO_2, ammonia, refrigerants, carbon monoxide, SO_2, NO_2, chlorine, and many more. CET instruments can be configured to suit any application, from small to large.



Detection of carbon dioxide is an important part of winery workplace safety. People die every year from exposure to high concentrations of CO_2.

CET introduces the Falcon-II handheld CO_2 monitor. Now you can monitor CO_2 concentration inexpensively.

Monitoring fermentation areas or vessels for dangerous concentrations of CO_2 is an essential part of maintaining a safe workplace. Handheld instruments can make air quality monitoring simple, and datalogging capability can create records to prove compliance. Temperature and relative humidity can be measured to optimize the environmental conditions.

Installing a CO_2 detection system to monitor the concentration of CO_2 in the fermentation area and automatically activate ventilation equipment is an effective way to ensure the area is safe and to ensure compliance with workplace safety regulations. Prolonged exposure to high concentrations of CO_2 can be fatal. To protect winery personnel, call CET.

For more information, contact:
Critical Environment Technologies
Bob Davidson
toll-free: 877/940-8741
e-mail: marketing@cetci.com
website: www.critical-environment.com

PLEASE SEE CRITICAL ENVIRONMENT TECHNOLOGIES AD, PAGE 24.

RLS Equipment Co., inc.

RLS Equipment Company has provided wineries with quality equipment and service for more than 40 years. As agent for Kiesel, Amos, Strassburger, and Magitec, RLS can supply complete crushing and pressing facilities.

Kiesel progressive-cavity pumps are available in hopper and in-line styles from 1,000 liters per hour to 200+ tons per hour (tph). The Kiesel "corrugated" tube-in-tube heat exchangers can process from hundreds to thousands of gallons per hour, and save $$$ in energy costs.

Strassburger's MCC Crossflow Filtration system is a completely PLC-controlled unit that allows highly flexible control, and yields one of the lowest recirculation rates (less pumping of wine). Strassburger also offers high-quality plate/frame, and lees filters. S/S construction with either S/S or noryl plates are durable and easy to clean. A wide variety of filter pads is available.

New in 2009: the Magitec A-5 model, designed for hand-sort/ultra low-capacity volume. Magitec destemmer/crushers are available from 2.5 tph to 60+tph capacity with Magitec's unique square-hole basket. Magitec offers a variable-speed, dual-drive system (basket/beater bar) on small units, and split machines with vibrator sorting tables between destemming and crushing.

RLS offers the Amos Engineering model ADM921 destemmer-crusher, with the performance and features of the original A-series, plus updated design/manufacturing. Amos Distribution offers a variety of affordable and effective sorting tables.

RLS offers domestically-produced OEM-material, replacement membranes for most presses, and an extensive used equipment listing.

For more information, contact:
RLS Equipment Co., Inc.
1017 White Horse Pike
Egg Harbor, NJ 08215
tel: 609/965-0074 or
West Coast tel: 800/527-0197
fax: 609/965-2509
e-mail: rls.equip@att.net
website: www.rlsequipment.com

PLEASE SEE RLS EQUIPMENT AD, PAGE 71.

Skolnik Industries, inc.

Skolnik stainless steel cooperage is designed to meet the special needs of winemakers in all stages of fermentation, maturation, and storage of fine wines. Skolnik has a long and proud tradition of providing leading winemakers with stainless steel drums of high quality, durability, and design.

Skolnik's wine industry customers look to stainless steel cooperage to supplement oak barrels in key stages of the winemaking process. Stainless steel offers unique and unsurpassed qualities for preserving product integrity and purity — important considerations for why stainless is a key tool for winemakers.

Stainless steel cooperage is:
- Versatile and adaptable to many uses,
- Ready for use after being sterilized,
- Cost-effective and long-lasting,
- Predictable, reusable, and easy-to-clean,
- Virtually maintenance-free,
- Available in sizes from 5 to 55 gallons.

SKOLNIK INDUSTRIES, INC.
MANUFACTURERS OF STAINLESS STEEL BARRELS

Skolnik is a full-service manufacturer of steel containers and accessories. Every Skolnik container is thicker, heavier, and stronger than industry standards — a commitment made to customers for more than 75 years.

For more information, contact:
Skolnik Industries, Inc.
Jason Snow
4900 S Kilbourn Ave., Chicago, IL 60632
tel: 773/362-1913; fax: 773/735-7257
e-mail: jason@skolnik.com
website: www.skolnik.com

PLEASE SEE SKOLNIK INDUSTRIES AD, PAGE 60.

CUNO incorporated

CUNO is a world leader in the design and manufacturing of a comprehensive line of filtration products and systems for the clarification and final filtration of fine wines.

Innovative CUNO products for wine filtration include the first dual-zone clarification depth filter cartridge (Zeta Plus Maximizer.), the first integral multi-zoned membrane prefilter (LifeASSURE®), and the first nylon-based final membrane filter optimized for repetitive hot water exposure (BevASSURE®).

CUNO recently added the BevASSURE PES line of final membrane filters. BevASSURE PES, a new, polyethersulfone membrane final filter that combines three innovative technologies from CUNO to significantly improve filter throughput and drive down operating costs. A highly asymmetric microporous membrane, a patented pleating design, and a novel, patent-pending support layer construction deliver ultra-fast flow rates, secure spoilage organism retention, and remarkable throughput.

With over 90 years of experience and manufacturing facilities on five continents, CUNO is uniquely suited to provide solutions to wineries worldwide.

For more information, contact:
CUNO Incorporated, a 3M company
400 Research Pkwy, Meriden, CT 06450
tel: 800/243-6894; fax 203/630-4530
e-mail: cjohara@mmm.com
website: www.cuno.com

PLEASE SEE CUNO AD, PAGE 70.

Silver State Stainless, Inc.

Silver State Stainless manufactures custom stainless steel tanks using high-quality fabrication services and craftsmanship, combined with high customer value and on-time delivery.

SILVER STATE STAINLESS

Silver State Stainless offers these features and options on their tanks:

- Choice of metals: 304 or 316;
- Various heating and cooling options;
- Custom configurations;
- Process piping and agitation units;
- Easy-to-use and versatile, variable capacity tanks;
- EPDM gasketing system with a softer, more pliable durometer for easy sealing and removal;
- Universal clamping system on removable-top tanks, allowing the lid to be applied from any position in a 360-degree radius;
- 110-volt electrical cable winch arm and boom for easy top-access;
- Polished integrated leg system with adjustable footpads;
- Lower tank bracing and cross members (¼-inch thick), for structural soundness and easy repositioning.

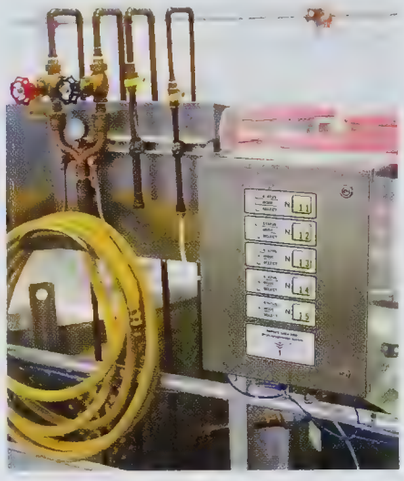
Silver State Stainless has incorporated the latest technology in automated resistance welding, and designs and manufactures tanks to exact engineered specifications. Heating and cooling jackets have been pressure-tested to 600 PSI, with a working pressure of up to 250 PSI.

For more information, contact:
Silver State Stainless, Inc.
12 Industrial Pkwy., Ste. E1
Moundhouse, NV 89706
tel: 775/246-1180; fax: 775/246-1183
e-mail: sales@silverstatestainless.com
www.silverstatestainless.com

PLEASE SEE SILVER STATE STAINLESS AD, PAGE 96.

American Tartaric Products, Inc.

For years, winemakers have added oxygen to wine — it has only been in the last decade that specific tools for this task became available. Parsec has revolutionized micro-oxygenation technology by offering the only system that supplies oxygen by weight instead of volume.



When releasing a potentially dangerous gas like oxygen in a wine tank, you have to be absolutely sure that the quantity you release is precise, in order to be able to repeat it. There is a wide range of equipment that measures oxygen dose by volume (ml). A liter of gas can be a very small quantity (at low pressure and high temperature) or very large quantity (at high pressure and low temperature). To measure gas by liter, a winemaker must refer to a specific pressure and a specific temperature.

Usually, micro-oxygenation equipment is fed by a gas cylinder, and the pressure-reduction gears are not able to provide a precise pressure value. Parsec systems have taken this into account by measuring the weight of the oxygen molecule, temperature, and pressure to the micro-second with no calibrating, assuring the most accurate system available today. Systems are available from one to 120 units and are PC-compatible.

For more information, contact:
American Tartaric Products, Inc.
1230 Shiloh Rd., Windsor, CA 95492
tel: 707/836-6840; fax: 707/836-6843
e-mail: bill@americantartaric.com
website: www.americantartaric.com

PLEASE SEE AMERICAN TARTARIC AD, PAGE 25.

VTI-Valtronics, Inc.

Valtronics offers carbon dioxide (CO_2) sensors for monitoring worker safety during the fermentation process. Sensors can be used in barrel cellars, storage tanks, bottling rooms, winery pits, and sumps.

Valtronics Model 2156 CO_2 sensor features include:

- Complete self-contained units;
- Cost effective and high quality;
- Non-dispersive infrared (NDIR) technology;
- No moving parts — gas diffusion sampling;
- Solid-state throughout with industrially robust, 0 to 5 volt and 4 to 20 milliamp linear outputs;
- Fast warm-up;
- Resistant to humidity and moisture;
- Dust-tight, water-resistant fiberglass enclosure;
- Dual-level detect set-points and relays;
- Digital readout with 0.56-inch red LED display;
- Built-in audio alarm that beeps at low CO_2 levels, and continuous alarm at high CO_2 levels (with a switch to turn off).

VTI Valtronics, Inc.

For more information, contact:
VTI-Valtronics, Inc.
3463 Double Springs Rd.
Valley Springs, CA 95252
tel: 209/754-0707; fax: 209/754-0104
e-mail: vti@val-tronics.com
website: www.val-tronics.com

PLEASE SEE VALTRONICS AD, PAGE 20.

WINESECRETS

American Winesecrets LLC sells STARS technology to the North American wine industry. STARS (Selective TArtrate Removal System) uses electrodialysis technology to reliably remove tartrate salts from wine, providing cost savings by reducing energy consumption and wine loss, wine quality improvement through selective action, operational efficiency by working at a predictable rate, and reliable stability by continuous in-line monitoring of conductivity.

STARS models available include:

- ED- 400 400 gal/hr of stable wine
- ED- 800 800 gal/hr of stable wine
- ED-1200 1200 gal/hr of stable wine
- ED-2400 2400 gal/hr of stable wine

STARS has won the "Flex Your Power" Award and established a new global standard for tartrate stabilization.

Winesecrets provides North American wineries with new and eco-friendly wine technologies, answering the challenges of brand consistency, stylistic integrity, and environmental sustainability. Winesecrets is a partner in progressive wine craft today, and is a valuable resource for tomorrow's priorities.

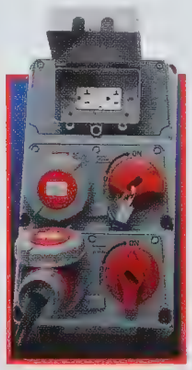
Winesecrets provides services from Napa, Sebastopol, and Paso Robles, CA; Dundee, OR; Richmond, WA; Penticton, B.C Canada, and Niagara on the lake, Ontario, Canada.

For more information, contact:
Winesecrets
tel: 707/824-2022 or toll-free: 888/656-5553
e-mail: domingo@winesecrets.com
website: www.winesecrets.com

PLEASE SEE WINESECRETS AD, PAGE 65.

MENNEKES® ELECTRICAL PRODUCTS, INC.

AMAXX® by MENNEKES is the next generation of power distribution, offering wineries new ways to save time, labor costs, and space. AMAXX's configurable receptacle combinations allow for complete customization based on the application or situation. One AMAXX unit can replace multiple receptacle installations typically found in barrel storage, tank areas, and crush pads. A single unit means one installation, and one set of wiring, reducing labor costs. AMAXX modular units are easy to service and maintain. AMAXX helps wineries of any size run more efficiently and more cost-effectively.



AMAXX is available in a single gang up to a five-gang model, and all units are rated NEMA 4X. Its non-metallic enclosure and module plates are molded from GE Valox thermoplastic material.

AMAXX is another product innovation from MENNEKES, a world-leading manufacturer of industrial electrical products. For more than 70 years, MENNEKES has set the standard for product materials, design, performance, and safety.

AMAXX® by MENNEKES

To learn more about AMAXX and the complete range of MENNEKES products, call 1-800-882-8110 or visit www.goMENNEKES.com.

For more information, contact:
MENNEKES Electrical Products, Inc.
277 Fairfield Rd., Ste. 111, Fairfield, NJ 07004
tel: 800/882-8110; fax: 973/882-5585
e-mail: info@MENNEKES.com
website: www.goMENNEKES.com

PLEASE SEE MENNEKES AD, PAGE 15.

WOLFF'S WELDING & FABRICATION
STEPHEN KOSTER CONSULTING

For more than 25 years, Wolff's Welding & Fabrication, in association with Stephen Koster, Winery Process Consultant, has served the wine industry, providing services from crushpad layout, to complete facility design and integration.

WOLFF'S

Wolff's manufactures equipment of the highest possible standard. Beginning in the early 1980s, Dick Wolff has worked with many winemakers, always seeking ways to improve the quality of grape processing.

Gentle handling of fruit has been the emphasis in recent years, beginning in the vineyards with harvest, through receiving and processing at the winery.

Stephen Koster

While respecting winemaking requirements, Wolff and Koster have applied the latest technology in receiving and leveling tables, belt conveyors, eccentric drive conveyors, M.O.G. separators, vibrating systems, and air separation.

Wolff and Koster can now meet production needs of large wineries seeking the same intact, whole-berry fruit processing quality as small artisan producers. Using multiple destemmers and high-output M.O.G. separation tables, Koster and Wolff can help wineries achieve greater production levels.

For more information contact:
Wolff's Welding & Fabrication, Inc.
21481 Eighth St. East, Sonoma, CA 95476
tel: 707/933-8590
e-mail: dw@wolffswelding.com
License No. 791682
Stephen Koster Consulting
PO Box 990, Geyserville, CA 95441
tel: 707/433-7029
e-mail: stevekoster@hughes.net

PLEASE SEE WOLFF'S/KOSTER AD, PAGE 46.

Pulsair Systems, Inc.

Pulsair's innovative "Pneumatage" is a proven method of managing the cap on red wine during fermentation. The process and equipment is being used worldwide to replace pumpover, punchdown, irrigation, and other conventional methods of cap management, to produce high-quality, more drinkable wine at low cost.

Pneumatage automates the fermentation cycle, leaving the winemaker to test, examine, evaluate, and taste the wine during fermentation, and not worry about the daily chores of turnovers, labor management, and paperwork.

Pulsair™
SYSTEMS, INC.

The Pulsair TM and PTM all-pneumatic portable mixers allow small wineries to turn the cap from the top of the fermentor, or through the racking port. The Wine Cart expands the ability of the TM and PTM mixers to include mixing of large tanks, in a semi-automatic mode.

The fully-programmable Pneumatage system will turn multiple tanks on a pre-determined time schedule for 14 days. More than 100 tanks can be operated from one central controller. When fermentation is completed, any Pulsair system can be used to quickly mix and blend, to create a great Estate Vintage.

For more information, contact:
Pulsair Systems, Inc.
tel: 425/455-1263; toll free: 800/582-7797
e-mail: sales@pulsair.com.

PLEASE SEE PULSAIR SYSTEMS AD, PAGE 65.

Flextank, Inc.

Oak wine barrels are one of the few pre-industrial revolution items still in regular use and essentially unchanged for centuries. They perform three fundamental functions in the maturation of wine — containment, flavor addition, and oxygen permeability, which facilitates complex changes during the aging of high-quality wine.

Flextank's patent-pending maturation vessels provide all of these functions with more winemaker control, in a hygienic and long-lasting vessel made from food-grade polyethylene. Vessels are available from 50 to 600 gallons that behave like a second-year barrel in terms of oxygen permeability.

Consistency of performance between vessels, and the availability of a wide range of oak adjuncts in the form of staves, chips, spirals, blocks etc., allows a winemaker a veritable smorgasbord of opportunity to experiment with flavor in a reproducible environment.

300-gallon stackable maturation vessels.

Used in Australia since the 2004 vintage, Flextank vessels are producing trophy-winning wines, including the top Pinot Noir at the prestigious 2006 Royal Melbourne Wine Show. The success is attributed to retention of volatile flavor compounds lost from barrels, and much-improved hygiene. In addition to improving quality, the vessels offer compelling cost advantages when compared with traditional barrels.

For more information, contact:
Flextank, Inc.
1200 Knob Creek Dr., Athens, GA, 30606
tel: 706/316-1622; fax: 706/534-8704
e-mail: john@flextank.biz
website: www.flextank.biz.

Ogletree's, Inc.

For 60 years, Ogletree's has specialized in custom fabrication of winemaking equipment. By relying on the continual pursuit of innovation and the company's historical stability, Ogletree's is able to optimize value and quality to satisfy the wine industry's needs, while providing customers with the security that the job will be done right the first time.

Ogletree's manufactures high-quality hoists, receiving hoppers, belt and screw conveyors, sorting systems, transfer lines, catwalk systems, and more. Ogletree's provides maintenance on all equipment offered.

Ogletree's has added two new bin dumpers to the product line. The first uses a 110-volt linear actuator to dump, eliminating expensive, bulky hydraulic systems. It also features a gate to provide superior metering by holding back grapes, then releasing them in smaller amounts. Another bin dumper can be loaded by pallet jack or forklift, and is designed for direct-to-press feeding. It also can be upgraded to feed both doors of a two-door press.

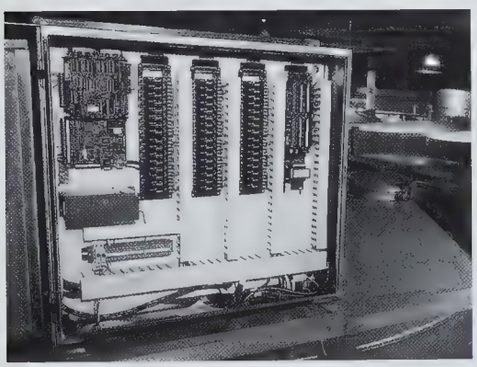
Ogletree's years of service to the wine industry serve as a foundation to its design team, who design a superior product by collecting input from clients and focusing on specific needs. By utilizing solid quality-control procedures and a precise six-point inspection, Ogletree's team of experienced fabricators deliver products second-to-none.

For more information, contact:
Ogletree's, Inc.
935 Vintage Ave., St. Helena, CA 94574
tel: 707/963-3537; fax: 707/963-8217
e-mail: speers@ogletreecorp.com
website: www.ogletreecorp.com

PLEASE SEE OGLETREE'S AD, PAGE 22.

Logix Controls

Logix Winery Control Systems (WCS) provide energy-efficient operation of refrigeration related equipment, with documented savings in excess of 40%. The Logix WCS monitors and manages loads to minimize energy use, coordinating the demand and supply side of a winery's refrigeration system to provide cooling at the lowest possible energy consumption. Providing integration and control of wine tanks, compressors, chillers, air units, CO_2 monitoring/fresh air exchange, waste water management, and more, the Logix WCS is specifically designed for the demands of winery control applications. The Logix WCS modular design provides easy expansion to cover additional equipment as your facility grows.



The Logix TC-2000 electronic thermostat with NEMA-4X waterproof enclosure provides stand-alone single- or two-stage cooling and/or heating control of wine tanks. The TC-2000 can also be networked for integration with a Logix Winery Control System. All operating data and alarms are logged and available for plotting and reporting.

Logix draws on more than 20 years of control system design and installation in the U.S. and around the world.

LOGIX

For more information, contact:
Logix Controls
10518 NE 68th Street, Kirkland, WA, 98034
tel: 425/828-4149; fax: 425/828-9682
e-mail: contact@logix-controls.com
website: www.logix-controls.com

PLEASE SEE LOGIX CONTROLS AD, PAGE 21.

Sanitary Stainless Welding, Inc.

Sanitary Stainless Welding, Inc. manufactures custom fabricated storage and fermentation tanks for the wine industry. Tank sizes offered range from 250 gallons to 700,000 gallons.

Options include, but are not limited to:

- dimple jackets;
- channeled jackets;
- manways of various sizes;
- sample and racking ports;
- a variety of fittings and valves.

Tanks are offered with sloped or conical bottoms to sit on either metal or concrete bases. Tank Tops include off-center, truncated or centered, conical tops.

Sanitary Stainless Welding, Inc. offers custom-design catwalks in either stainless steel or aluminum. The company also offers "tube in tube" heat exchangers, grape receiving hoppers, screw conveyors, tubing line installation, crusher repairs, press repairs, tank modification, and tank repairs.

Sanitary Stainless Welding, Inc. was founded in the original Valley Foundry facility in 2004, to be a premier tank construction solution.

For more information, contact:
Sanitary Stainless Welding, Inc.
2550 S. East Ave., Ste. 101-B
Fresno, CA, 93706
tel: 559/233-7116; fax: 559/233-7172
e-mail: jimm@sanitarystainless.com

PLEASE SEE SANITARY STAINLESS AD, PAGE 79.

Electro-Steam Generator Corp.

Electro-Steam Generator Corp. has manufactured all-electric steam generators since 1952.

The generators operate at 98% efficiency and produce culinary-grade steam. They are designed for point-of-use placement or with portable mounting. Some of the many uses include: sterilization of bottling lines, dissolving tartrates, barrel maintenance, and general cleaning.

Water use is drastically reduced to only a few gallons per hour, not per minute.

Electro Steam

Because there is no flame, Electro-Steam generators are safe to operate, resulting in lower insurance costs.

Basic maintenance will extend the life of an Electro-Steam unit by many years.

Each generator is hand-built to meet each winery's requirements. The units are manufactured under the ASME Code, are National Board of PVI Shop-Inspected, and UL. CSA certification is provided upon request.

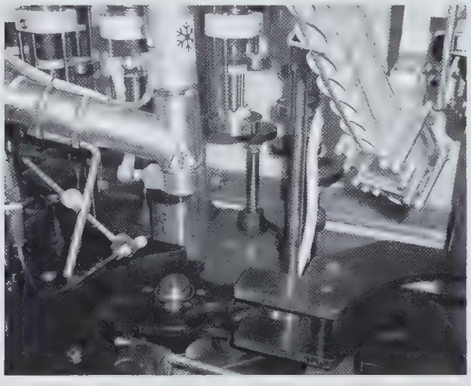
For more information, contact:
Electro-Steam Generator Corp.
PO Box 438, Rancocas, NJ 08073
tel: 866/617-0764; fax: 866/617-0765
e-mail: jharlin@electrosteam.com
website: www.electrosteam.com

PLEASE SEE ELECTRO-STEAM AD, PAGE 60.

Cryotech International

Cryotech International, a leader in liquid nitrogen delivery systems for container pressurization and/or oxygen displacement, can help wineries reduce headspace oxygen and extend shelf-life in screw cap packages while maintaining taste.

More and more winemakers are making the switch to screw caps to preserve the fresh fruit taste of their wines and to reduce bottling cost. With this change comes concern over the additional headspace that would normally be displaced by a cork. The headspace can become a holding area for excess oxygen and cause oxidation of the wine.



Many winemakers have discovered that adding liquid nitrogen dosing to their bottling operation is a cost-effective way to eliminate excess oxygen and maintain wine taste and quality.

Cryotech has a complete line of liquid nitrogen dosing equipment to automate and control the introduction of LN_2. A very small dose of LN_2 is injected into the filled bottle. One part of liquid nitrogen warms and turns into 700 parts of gas, displacing O_2 from the headspace.

After installing a Cryotech injection system, one customer reported dissolved oxygen content of less than 0.03 ppm without compromising the fresh fruit taste of the wine.

For more information, contact:
Cryotech International
745-B Camden Ave., Campbell, CA 95008
tel: 408/371-3303; fax: 408/371-3303
e-mail: salesinquiry@cryotechinternational.com
website: www.cryotechinternational.com

Lodi International Wine Awards competition invites entries

Wine submissions for the second annual Lodi International Wine Awards (LIWA) competition are being accepted from wineries around the world until Wednesday, Feb. 18, 2009. Price for entries is $60. Please ship wines to Woodbridge Winery, 5950 E. Woodbridge Road, Acampo, CA 95220. For questions regarding entries, please contact Aaron Kidder at aaronkidder@gmail.com or 209/969-9296.

Wine judging / sensory evaluation

Nobody argues that people have "different palates." What remains unanswered is just how different are our palates and what does it matter?

The number and types of taste buds you have and your sensitivity to different tastes and smells largely determine how sensitive or tolerant you are to many wine flavors and ultimately shapes your wine preferences.

The most sensitive people in the wine consumer world are not necessarily the most expert. People with the highest sensitivity quotient are most likely to be White Zinfandel drinkers, according to Tim Hanni, a Master of Wine, former chef, and pioneer in wine and taste. His research shows that the more sensitive tasters drink significantly less wine and spend less money on the wines they buy. This misunderstanding about consumers, Hanni asserts, is costing the wine industry millions of dollars in lost revenue.

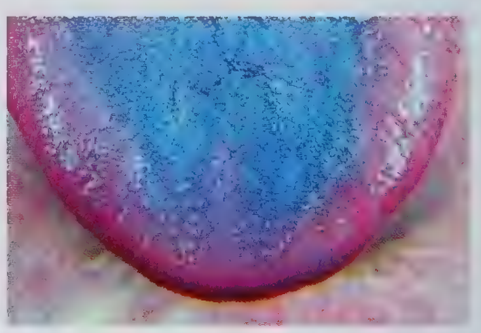
Hanni has found a simple reason for why you like what you like when it comes to wine. Hanni's "Taste Budometer™" methodology was used in the 2008 LIWA, where 525 wines were tasted and scored by judges who had their sensitivity analyzed. The findings from this judging are being used to improve the sensitivity analysis and scoring system for the 2009 competition.

The LIWA is the first and only competition to use Hanni's evaluation methodology. The team of Hanni, G. M. "Pooch" Pucilowski and Aaron Kidder, founders of Diversity Wine Awards, LLC, also takes into account issues of flavor distortion and palate fatigue that often occur at wine tastings where many wines are evaluated over an extended session.

What is the Taste Budometer™?

The Taste Budometer™ was born from researching how to better understand the sensory aspect of wine and food. He found that wine tasters frequently described completely different sensations even though they were tasting the same wine. Due to sensitivity variables, people experience vastly different tastes from the same wine.

Using the Taste Budometer™, Hanni formed Diversity Wine Awards with Pucilowski and Kidder to create a new platform for improving the relevance, quality, and consistency of wine judging results.



Tolerant taster's tongue

"Our hypothesis was that we could apply the Taste Budometer™ principles to a pool of wine judges," explains Hanni, "create balanced panels for assessing the wines and then deliver the results so that consumers can find the medal-winning wines from the judges with similar sensitivities. This will provide more consistent results in the long term." (See the website www.lodiwineawards.com for the judge's sensitivities and 2008 judging results.)

Competition details

Judges at the first LIWA were screened before tasting and split equally into one of three tasting groups based on sensory sensitivity, wine value/rating systems and stylistic preferences. These include "tolerant tasters,"

Continued on page 137

SMART VITICULTURE by Dr. Richard Smart

Pennsylvania, past, present and future

In August of 2008, I visited Pennsylvania and Virginia to deliver seminars to grapegrowers. In this column, I offer my impressions of the developing wine industry in Pennsylvania.

Pennsylvania is the site of the first commercial vineyard in the U.S., which was planted along the Schuylkill River in what is now Fairmount Park in Philadelphia. William Penn, founder of Pennsylvania, planted the first vinifera vines in the state in 1683. Despite these very early beginnings, the Pennsylvania wine industry has not kept pace with the industry in the western states or even in other eastern states, such as New York, Maryland, New Jersey, and Virginia. A recent study found that the grape and wine industry contributes $3.3 billion to the economy of New York state, for example.

The Pennsylvania wine industry leadership is seeking to address this issue. The Pennsylvania Wine Marketing and Research Program commissioned MKF Research (St. Helena, CA), to study the economic impact of the Pennsylvania wine sector. For an industry with only 1,800 acres, 104 wineries, and 150 winegrape growers, the economic impact is extraordinary. In the wine and affiliated tourism industries there are 5,200 full-time equivalent jobs. Wine retail value is estimated at $28 million and winegrape value at $6.7 million, generating $37.5 million of state and local taxes. Tourism expenditure by 877,000 visitors is estimated at $167 million.

The Pennsylvania wine industry has recently released a "Vintage 2012" document. This is a proposal to double the impact of the Pennsylvania wine industry on the local economy over the next five years, using an allocation of $.10 per gallon of wine sold in Pennsylvania to invest in research, education, and marketing.

Pennsylvania seminar highlights

One of the features of small winegrowing states like Pennsylvania is the important and unifying work done by local grape extension people. Mark Chien leads the

Dr. Smart relates internode length to vine vigor on a Cabernet Sauvignon shoot with Jan Waltz.

Merlot vines (with double trunks in case of winter injury) converted from Scott-Henry to VSP trellis at Waltz Vineyard.

HILL & ASSOCIATES
Global Executive Search and Recruiting
Premium Wine Industry Specialists since 1985.
Contact: Tom Hill
(707) 258-2000
1370 Trancas St. #165 Napa, CA. 94558
e-mail: Tom@BestWineJobs.com
www.BestWineJobs.com
Areas of recruiting and placement include:
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Ice Wine Juice For Sale
CEDAR RIDGE VINEYARDS
For more information:
Jim Knowles
19277 Gore Rd.
Blenheim, ONT N0P 1A0
Canada
Tel: 519.676.5512
Fax: 519.676.5160

Pennsylvania grape extension program, and he provides excellent support to the sector with a series of publications, seminars, and an email bulletin. Chien and the local grape-growing organizations sponsored a field day where I made a presentation at the Waltz Vineyard, Manheim, PA.

I found the 15-acre Waltz Vineyard at Manheim to be very well managed and a credit to Jan Waltz and Jeff Zick, vineyard manager. During my presentation and in conversations with Waltz, I discussed ideal vine vigor and canopy density and how to choose between the Scott Henry trellis and a vertical shoot positioned (VSP) trellis.

Over the last few years, Waltz has converted some blocks of Scott Henry trellis to VSP. We discussed his problems with managing Scott Henry and whether the resulting VSP canopy is ideal for his vineyard (vines are mostly space 8x4).

During the seminar, I offered guidelines on managing a Scott Henry trellis. First, the shoot positioning operation of both upper and lower sections should be completed with a maximum of three passes through the vineyard (each requiring about four hours of labor per acre). I suggested that, at the completion of each pass, the vineyard manager calculate time taken to do the operation to be sure it is within this guideline.

Second, vineyard workers should not be moving individual shoots, but rather using their arm or the wire to move several shoots at once. One reason why there can be problems with canopy division of Scott Henry is because of poor timing. The first pass to brush shoots outward should be done just before bloom. The second pass, which results in downward-pointing shoots being attached behind the wire, and the first lift of upwards shoots, should be after fruit set. The third pass completes wire moves for the upward-growing shoots. Details are in my book *Sunlight into Wine*.

Next, I reviewed the role of canopy management in profitable viticulture and winemaking. Appropriate canopy management practices do help growers and vintners make money. First, they reduce disease, including downy and powdery mildew, and botrytis. For example, these problems were evident in Pennsylvania in 2007 when the state suffered late season rains. If the vine canopy is open, such diseases develop more slowly and spray applications are more effective.

Furthermore, an open canopy on well-balanced vines assists fruit ripening. Many growers use the misguided practice of fruit thinning in the belief it will improve fruit composition. Fruit thinning does not always work, but, invariably, it costs a lot of money. To improve fruit composition, growers are better advised to invest labor in canopy management to promote fruit and leaf exposure rather than removing crop. Recent research helps explain why fruit exposure is important to wine quality.

I also emphasized the desirability of taking simple measurements in the vineyard to guide management. The easiest and yet most effective measurements are pruning weight of representative sample vines and counts of cane numbers before pruning. This information allows a grower to calculate some key performance indicators.

For example, if the shoots are appropriately positioned, a well-balanced vine will have 15 shoots per meter (about five shoots per foot) for an open canopy. A balanced vine will have a yield-to-pruning ratio of approximately 3-5:1. Another important measure of vine vigor is average cane weight, and for many cultivars, the ideal weight is around 35 to 45 g. If canes are smaller than this, the vines have been pruned to leave too many buds. If the canes are heavier, then more buds need to be retained at winter pruning.

After the seminar, 24 growers joined us for dinner, and many shared impressive wines for tasting. I particularly enjoyed three Pinot Noir wines, showing excellent typicity, and a Vidal ice wine. A surprise to me was an Albariño produced in central Maryland. Growers in Pennsylvania are also experimenting with Gruner Veltliner, Sauvignon, and Viognier, and other vinifera varieties.

Conclusion

Growing grapes in the eastern U.S. is more difficult than on the West Coast, with the problems of winter cold injury and summer rainfall with associated diseases. However, the East Coast has the advantage of **many** local consumers, who are becoming more aware of local wine quality. Wine consumption in Pennsylvania is the eighth highest in the U.S., yet Pennsylvania supplies only 4% of wine sold. Good opportunities for growth are apparent in the Pennsylvania wine industry and other eastern states, particularly as they plant more vinifera grapevines. ■

Dr. Richard Smart, "the flying vine-doctor," is an international viticultural consultant based in Launceston, Tasmania, in Australia. He can be contacted by e-mail: vinedoc@bigpond.net.au. Read about Dr. Smart's business, including his consulting schedule, educational wine tours, and seminars, at his home page http://www.smartvit.com.au. He visits America frequently and his consulting schedule is arranged by Vinquiry in Windsor, CA, tel: 707/ 838-6312 and http://www.vinquiry.com.

CALENDAR

March 19 — RAVE
UC Davis Robert Mondavi Hall, North Quad.

Learn about the development, manipulation, and characterization of flavor components in winegrapes and wine at the "A Focus on Flavor" seminar presented by the UC Davis Dept. of Viticulture & Enology and the Trellis Alliance®. Recent Advances in Viticulture and Enology annually shares the latest applied research with wineries and grapegrowers.

Recent research into the nature and nurture of flavor compounds in the vineyard will include new information on "vegetal" compounds — the pyrazines — and how their concentrations might be finessed in berries to meet a winery's style considerations. Researchers will introduce recent data on the impact of viticultural practices on wine quality.

Flavor compounds in wine and a correlative discussion on the sensory aspects of each compound will include secondary metabolites and interactions with each other. New fining options to maximize flavor while minimizing wine loss will be discussed.

9AM–4PM Registration of $220 includes lunch and one-year membership in the Trellis Alliance. To register, call 800-752-0881 or go to: www.extension.ucdavis, edu/winemaking.

Bottling — Last line of microbial defense

Bottling is the final step of wine production during which the wine can be microbiologically compromised. It is critical that all necessary steps be taken to establish and maintain a microbiologically stable product. Lack of attention to detail in bottling will almost certainly lead to a microbiologically unstable finished wine. If a consumer opens an unstable bottle of your wine, it is clearly bad for business.

What is microbiologically unstable wine? It is wine containing viable microbes that have the potential to initiate post-bottling microbiological activities. These activities could be secondary fermentation (production of carbon dioxide); production of off-aromas/off-flavors (acetic acid, mousiness, 4-ethyl phenol/4-ethyl guaiacol); and/or formation of sediments, viscosity, and/or off-color.

What can you do to protect your wine from microbiological instability?

Nature of potential problems

Like bottling in all beverage industries, bottling wine is a complex process that incorporates many different disciplines, including microbiology, chemistry, quality assurance/quality control, engineering, maintenance, production, and environmental sciences. Due to this complexity, there is ample opportunity for problems to arise.

Therefore, both wineries with bottling lines and mobile bottlers must have systems in place — such as a Quality Assurance/Quality Control (QA/QC) program, Good Manufacturing Practices (GMP), and a preventative maintenance program — to address the multiple areas/locations that can microbiologically compromise finished product.

Table 1 provides an overview of the potential sources of microbial problems throughout the wine bottling process.

Microbial defense strategies

Each winery must have a microbial defense strategy for every wine it bottles to prevent post-bottling microbiological activity. Even in situations where a wine is chemically and microbiologically stable, precautions against contamination must be in place from the bottling tank through closure of the finished product. These precautions are critical because both stable and unstable wine can pick up microbial contaminants throughout the bottling route if preventive strategies are ineffective or lacking.

A comprehensive microbial defense plan for bottling involves a two-pronged approach: 1) treatment of unstable wine (and in some cases stable wine) with preservatives or sterilants and/or filtration; and 2) a QA/QC program.

When a wine is known to be chemically and/or microbiologically unstable, it is imperative that the wine be stabilized with a treatment — such as a chemical preservative/sterilant or filtration or both — to help prevent downstream microbiological activity. These treatments are also recommended for stable wines in situations where a winery is uncertain about the effectiveness of its bottling QA/QC program.

Currently, winemakers preserve their wines with sulfur dioxide, sorbate, or Velcorin™ (dimethyl dicarbonate [DMDC]). DMDC is an effective antimicrobial agent for wine. It can be lethal to both yeast and bacteria, although higher concentrations of DMDC are usually required to kill bacteria. It has been approved to be used in wine at a maximum concentration of 200 ppm during the winemaking process.

Physically removing microbes through filtration still causes a great deal of debate within the wine community over what effect filtration has on wine quality. However, there is no question that sterile filtration (0.45µ membrane filter) will remove all of the offending microbes (that is all fully viable cells; there is some evidence that viable but non-

Table I: Potential sources of microbial problems throughout wine bottling process

Area/Location • Potential sources of microbial problem(s)
Water distribution system at winery
• Can harbor wine spoilage microbes, especially where wine has cross-contaminated water (inadvertent entry of wine into water well head, back-flushing of wine into water piping).
• Lack of effective and routine cleaning and sanitation of water piping system.
• Lack of routine microbial monitoring of water at designated locations throughout the water system.
• Poor sanitary design of piping system (i.e. poor drainage, dead legs, threaded pipes, uneven welds, rough areas, etc.).
Bottling tank
• Lack of effective and routine cleaning and sanitation.
• Poor sanitary design (i.e. poor drainage, uneven welds, rough areas, etc.).
• Lack of routine microbial monitoring of wine prior to bottling.
Wine distribution (piping) system from bottling tank to bottling facility
• Lack of effective and routine cleaning and sanitation.
• Poor sanitary design of piping system (i.e. poor drainage, dead legs, threaded pipes, uneven welds, rough areas, etc.).
Wine filtration system for bottling (if used)
• Poor sanitary design of wine filter housings and associated piping (i.e. dead-legs, threaded piping/fittings, uneven welds, rough areas).
• Lack of routine sanitation (i.e. hot water) of filters and filter housings.
• Lack of filter regeneration (daily or weekly flushing with cold water in forward flow direction at 1.5 X filtration rate followed by rinse with hot water, dilute caustic, or dilute citric acid solution).
• Lack of routine filter integrity testing (bubble point test).
• Lack or inconsistent monitoring of pressure on filters.
Wine piping from filtration system to bottling line
• Lack of effective and routine cleaning and sanitation.
• Poor sanitary design of piping system (i.e. poor drainage, dead legs, threaded pipes, etc.).
Addition of chemical sterilants/preservatives (Velcorin™ or SO_2) during bottling process
• Inadequate addition of chemical sterilant/ preservative due to poor dosage regulation.
Bottling line
• Lack of effective and routine cleaning and sanitation for all parts (rinser, sparger, filler, leveler, and corker).
• Most likely sources of contamination are environmental air, cork hopper, corker jaws, bottles, filler spouts (rubber spacers and gaskets), sparger, and leveler.
• Poor sanitary design of piping system (i.e. poor drainage, dead legs, threaded pipes, etc.).
• Sanitary gauges not used.
• Unsanitary bottles.
• Unsanitary process for sanitizing bottles (water or air).
• Lack of effective and routine microbiology audit process.

culturable [VBNC] cells can pass through a 0.45µ pore size, but this topic will be discussed in more detail in a later column), which makes this a very effective method for treating wine immediately prior to filling bottles.

Yet, many winemakers strongly believe that filtration negatively impacts wine's organoleptic qualities, stripping flavors, aromas, and/or color. Potentially, this group of winemakers have the option to use a membrane filter with a 0.65µ pore size, which effectively removes yeast cells but does not eliminate all bacteria.

If a winery has any question about wine instability and the effectiveness of its bottling QA/QC program, we recommend sterile filtering the wine. We have experienced many instances in which unstable wines and even wines thought to be stable, developed post-bottling microbiological activity.

Critical QA/QC program

The final preventative strategy is an effective and robust bottling QA/QC program. Without question, the absence of a QA/QC program or an ineffective one will lead to post-bottling microbiological activity. An effective program includes routine sanitation, regular monitoring of finished product for microbes, a set of specifications for allowable microbial levels in sanitation and bottled product, and routine monitoring and maintenance of bottling line equipment.

For most wineries (those not running 24 hours per day), daily sanitation of bottling line and associated equipment should be employed. Hot water or steam are effective methods for sanitizing bottling line equipment. If hot water is your choice, we recommend that 180°F/82°C water be used for **at least** 20 minutes. The temperature of the water must not be measured at the source, but rather at the most distant point from the source.

If steam is the preferred method, the target temperature of the condensate is 180°F/82°C for **at least** 20 minutes at the most distant point relative to the steam source.

Because it is difficult to sanitize the corker jaws and cork hopper using either of these methods, we recommend that corker jaws be sprayed or soaked in 70% ethanol daily and that the cork hopper be sprayed with 70% ethanol each time new corks are added.

On a weekly basis (or a daily basis if time permits), the bottling line should be cleaned with a caustic cleaner followed by hot water sanitation. On a quarterly or semi-annual basis, bottling line equipment should be taken apart and thoroughly cleaned.

Monitoring program effectiveness

In addition to developing and maintaining bottling line sanitation, it is important to monitor the effectiveness of your

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A Clean... Like You've Never Seen
More and more people in your industry are turning to Gamajet for solutions to their tank and barrel cleaning needs.
For decades, Gamajet has pioneered new and improved methods to not only clean, but extend the life of your wine barrels, enabling you to focus more on your business, and your passion. Gamajet's HD Barrel Blaster has been developed specifically for the wine industry. When inserted into a barrel, the HD scours 100% of the interior,.. ensuring that each barrel is clean and ready to go back into production. Call to learn more about Gamajet's HD Barrel Blaster, or visit us on the web at Gamajet.com
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COMPLIANCE COUNSELING *by Rachel Dumas Rey*

New TTB circular for alternating proprietors — PART II

In August 2008, the Department of Treasury's Alcohol & Tobacco Tax & Trade Bureau (TTB) published an industry circular on the topic of Alternating Proprietors at Bonded Wine Premises (2008-4). The circular seeks to clarify earlier publications on this topic, the last being published in 2003, and to make clear TTB concerns about the operations of alternating proprietors.

Publisher's note: This is *the second of a two-part interpretation of the circular. This column addresses particular policies TTB applies to alternating proprietors. Quoted excerpts from the circular alternate with author comments* **(RDR)**.

Industry Circular Number 2008-4, August 18, 2008

6a. Alternating proprietor agreements and the need for qualification — TTB reviews the need for a permit when we [TTB] examine applications for and operations under winery qualifications. Such examination includes whether the arrangement is truly an alternating proprietorship or whether it is really a custom crush arrangement.

Under 27 CFR 1.24(b), we may consider the applicant's business history and likelihood to commence operations in a reasonable period and maintain operations in conformity with Federal law as part of the qualification process. Under 27 CFR 1.50, we are authorized to revoke a permit if the permittee has not engaged in operations for two years.

The Director of the National Revenue Center may require a copy of the agreement or contract between the alternating proprietors, a business plan, or other information in support of each application for registry to operate as an alternating proprietor. TTB considers the business history of each applicant, his or her plans for development of future winery assets, and the level of commitment to the business as evidenced by investment in vineyards or other permanent assets. We examine each agreement or contract to assess the involvement of both parties in the wine operations, as well as the independence of each party.

When we look at business history, we find, in some cases, that an applicant for registry as an alternating proprietor has been a custom crush customer of a winery. Other applicants may have purchased finished wine with custom labels from the winery.

When a person with such a business history seeks to qualify as an alternating proprietor at the same premises where wine was being produced for that person on a custom crush or private label basis, TTB looks for actual or substantive changes in the arrangements between the wine producer and its former wholesale customer.

If it is evident from our reading of the agreement or contract submitted that an alternating proprietor applicant plans to have most or all of its wine operations conducted by its former wine supplier, we may find that the applicant has no intention of conducting winery operations and is therefore not qualified for a permit under § 1.24(b).

Other indications that one party to an alternation is not, in fact, involved in wine operations and may not qualify for a wine producer's permit include:

- A business plan that is primarily to market wine with little or no involvement in the wine production,
- A contract that specifies that a party will simply receive juice, ferment it into wine, and then transfer the wine to another party who performs all remaining wine processing activities,
- A contract for alternation that is based on quantity of wine produced and not on rental of space and equipment, and
- An agreement that indicates an alternating proprietor will have minimal involvement in its own wine operations. For example, if the agreement or contract states that another company's employees will handle the production activities, records, reports, and tax filings.

Although applicants making the arrangements described above may not qualify as wine producers, they may qualify for wholesale permits to market wine purchased from a producer or blender.

RDR: *TTB is very concerned about the distinction between alternating proprietors and custom crush operators. The concern is largely a result of custom crush operators who are actually licensed as alternating proprietors taking advantage of the small domestic producer tax credit.*

In reality, many small wine businesses evolve from custom crush arrangements to bona fide alternating proprietorships or actual bricks-and-mortar wineries over time. If a winery operator chooses to become an alternating proprietor, TTB staff conduct an extensive telephone interview to determine whether the applicant has the financial resources, knowledge, and experience to actually make and sell wine and whether the arrangement with the host winery is truly a lease for space and equipment. This does not mean that the applicant may not hire a qualified winemaker to make the wine at its licensed premises.

6b. Suitability of the premises for sharing; the importance of keeping the wines of each alternating proprietor segregated and identified — When two or more proprietors share premises, there is a potential for difficulty in separating and identifying one proprietor's wine from that of another. TTB must be able to locate and identify cased goods, barrels, and tanks assigned to each alternating proprietor.

The regulations covering alternating proprietors provide that "[a]ll operations in any area, building, floor, or room to be alternated will be completely finished and all wine, spirits, and other accountable materials will be removed from the alternated wine premises or transferred to the incoming proprietor. However, wine, spirits, and other accountable materials may be retained in locked tanks at wine premises to be alternated and remain in the custody of the outgoing proprietor" (27 CFR 24.136(b)).

Further, TTB regulations for all wine premises authorize the appropriate TTB officer to require a proprietor to segregate operations "to the extent deemed necessary to prevent jeopardy to the revenue, to prevent confusion between operations," and for several other purposes (27 CFR 24.27).

TTB will not approve plans which suggest that the floor space occupied by an alternating proprietor's barrels or cased

goods constitutes that proprietor's premises. In some premises, signage or other marks may be considered sufficient separation of one proprietor's wine from another's, but in other premises, TTB may determine that physical segregation such as fencing is necessary to protect the revenue. TTB will continue to make this determination on a case-by-case basis.

Additionally, TTB may require more identification or separation of alternating areas in previously approved operations if we [TTB] find that the daily practices do not provide adequate control and protection of the revenue.

Untax-paid wine of an alternating proprietor which cannot be stored in space specifically designated for that alternating proprietor must be tax-paid or transferred in bond to the bonded premises of another proprietor with sufficient storage space. The proprietor of the receiving premises is responsible for the recordkeeping and reporting of that wine while it is maintained on his/her premises.

Proprietors should be aware of potential label consequences of transferring wine in bond to another proprietor. For example, even if the wine remains in the same physical location, if the wine is transferred in bond to the custody of another proprietor, the producer would lose eligibility to label that wine with an "estate bottled" claim. See 27 CFR 4.26 for the rules on labeling an estate bottled wine.

RDR: *This circular states that TTB will not approve alternating plans "which suggest that the floor space occupied by an alternating proprietor's barrels or case goods constitutes that proprietor's premises." In reality, TTB has approved these kinds of alternating plans in the past.*

Typical alternating plans include the description of the alternating proprietor's permanent premises, which is some amount of square footage separated by lines painted on the floor or, in the worst situations, chain link fences. The plans also include alternating areas that are shared, including individual tanks, spaces on the winery floor for bin fermentation, bottling areas, etc.

TTB has also approved alternating plans that do not include any permanent space for the alternating proprietors. In such cases, the alternators and host winery have employed technological advances, such as radio frequency I.D. tags or bar coding on barrels and case goods to determine the location of a winery's inventory and virtually segregate that inventory from other proprietors' barrels and case goods.

When TTB staff were asked about how the use of these technologies might impact TTB's decision on the need for permanent spaces for individual alternating proprietors, they declined to answer. The good news is that they will continue to review each application on an individual basis.

6c. Employing the services of another proprietor's staff — The agreement or contract between the alternating proprietors may include the option to hire the services of another proprietor's production and office employees. We will look to factors of authority and control to make a determination whether the proprietor is running an independent bonded wine premises operation.

The proprietor employing the services of another proprietor's workers must direct and be fully responsible for those things that are usual and customary for the production, bottling, and storage of wine (as applicable), and the managing of the business. The producing alternating proprietor must provide its contract employees with written direction in the form of work orders or similar documentation.

Recordkeeping and reporting requirements under TTB regulations apply to the person who has physical custody of the wine, and are not based on who has title or legal ownership. We expect all proprietors to be able to access their winery records and to knowledgeably discuss those records with TTB officers. Relinquishing authority for the official records to a contract employee will be considered inadequate control.

Alternating proprietors are reminded that when compliance violations or additional liability are determined, the proprietor employing the staff, and not the individual staff members, will be cited for violations or assessed for underpayment of tax. If a proprietor maintains its records solely in the computer system of another proprietor or is required to allow another proprietor to access its records, TTB would consider those practices to be indications that the proprietor is not operating as an independent alternating proprietor.

RDR: *In my experience, licensed alternating proprietors do use the service staff of their host winery in the course of doing business in a shared facility. In fact, most host wineries have a long list of services that their tenant wineries may purchase, from bottling to the preparation of the Monthly Report of Wine Premises Operations (702). While taking advantage of these services often saves time and money, it is very important that each alternating proprietor maintain control of winemaking decisions and record keeping.*

Work requests should always be delivered in writing and should be specific. These requests should also be maintained with other winery records. Alternating proprietors should take the time to understand their record keeping and reporting responsibilities and should always sign all TTB filings.

6f. Eligibility of alternating proprietors for small domestic wine producer tax credit — If alternating proprietors are independent small producers, they may be eligible for the small domestic wine producer tax credit. TTB will examine alternating proprietor arrangements to see if the proprietors are independent or if they should be considered members of a controlled group.

In the latter case, all proprietors' production and removal amounts will be combined for the purpose of determining whether credit may be used by the group. If applicable, a single small domestic wine producer tax credit will be apportioned among all participants.

Indications that alternating proprietors are not independent may include:

- A contract that allows one alternating proprietor to transfer "excess" custom crush business to another alternating proprietor;
- An observed pattern of operations in which an existing alternating proprietor annually produces a very small volume of wine in order to qualify as a small producer for tax credit purposes, and then has a large volume of wine produced for it on a custom crush basis by another winery; or
- Evidence that a producer encourages its customers to become alternating proprietors in order to split production.

TTB will deny the credit if it benefits a large producer and will ensure proper reduction of the credit for persons producing more than 150,000 gallons of wine in a calendar year.

RDR: *The small domestic wine producer tax credit equals about $2.14 per case of wine and represents a significant savings for those who are eligible. For a winery removing 100 cases of wine with alcohol content between 14.1% and 21% by volume, taxes due without the credit are $372 compared to $159 after the credit is taken. If your credit is denied for any of the reasons stated above, you may be responsible for paying the additional $0.90 per gallon or $2.14 per case plus penalties and interest.*

6h. Alternation for less than a day — The regulations covering alternating proprietors provide that "operation of a bonded winery engaged in the production of wine by an alternate proprietor will be at least one calendar day in length" (27 CFR 24.136(a)). A winery engages in the production of wine by fermenting juice, ameliorating wine, adding wine spirits to wine, sweetening wine, producing effervescent wine, or producing formula wine. Receiving and crushing grapes are not production for purposes of winery qualification.

Specific extensions and curtailments of premises, such as use of a bottling line by an alternating proprietor, may be for less than one calendar day, as long as the extensions and curtailments are part of the approved alternation plan.

RDR: *What TTB is not telling you here is that you may request a variance from this rule by writing a letter to the TTB's National Revenue Center in Cincinnati, Ohio. The variance request must provide the reasons that this rule is impractical for the efficient operation of the entire facility and what measures the host winery and alternating proprietors will take to ensure segregation of the wine in the shared areas. The variance request letter should include the following language:*

"The alternating proprietor will keep records as required by Section 24.136 of 27 CFR, including the gallons of wine received or removed while operating in the alternating areas and the effective date and the hour when an area is taken over and surrendered by the alternating proprietor."

Conclusion

RDR: *We attempted to obtain answers from TTB staff to some very specific questions to clarify some operational policies about host winery/alternating proprietor relationships and were told that each application and existing alternating situation will be reviewed on an individual basis.*

Arthur Resnick of the TTB's Office of Public Affairs sent the following response: "The Industry Circular states what we [TTB] will look for in the future, either as we examine applications for new alternating proprietorships or as we investigate or audit existing alternating proprietorships. In each situation we will look at the arrangement between the parties, the specific premises and the operations to be conducted and decide if the proposed or existing arrangement will protect the revenue, prevent confusion between operations, and not cause administrative difficulty for TTB. If we determine that what is proposed or in place is not sufficient, we will ask for changes. We will be happy to work with individual applicants or proprietors on specific questions." ■

Wine Microbiology

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sanitation process. Use one or more of the following methods: 1) visual inspection; 2) adenosine triphosphate (ATP) testing; and/or 3) microbial swabbing/culturing. (These three methods were discussed in detail in the September/October 2008 ***PWV*** column).

Because the number of potential microbial contamination sources is quite high during bottling, it is also imperative that each winery conduct post-bottling microbial monitoring of its finished products. This is necessary even if wine is sterile filtered, because membrane filters can fail (through loss of integrity or blow-through of filters).

Ideally, bottles should be collected from the line every hour during every bottling run. At minimum, bottles should be collected off the line immediately after start-up, following employee breaks when the bottling line is not operating, and at the end of a run. At start-up and after employee breaks, microbes being retained on filters can be pushed through the membrane filters by the initial surge from the wine pump.

Once effective sanitation and microbial monitoring programs have been established for the bottling process, it is in the best interest of the winery to establish acceptable levels of ATP and/or microbial loads on bottling line equipment and acceptable levels of microbes in bottled product. By establishing these levels, the winery can prevent contaminated product from entering the marketplace, and it can undertake corrective action when levels are found to be too high on equipment or in wine being bottled.

Bottling maintenance program

The final element of a QA/QC program for bottling is a preventive and ongoing maintenance program for bottling line equipment. A lack of diligence in this area can lead to serious microbial contamination problems during bottling. If the equipment is not properly maintained, cleaned, and sanitized, microbes can quickly proliferate in the numerous nooks and crannies available. Once they have established themselves, microbes will continually contaminate your wine until their source is located and eradicated.

Conclusion

The bottling line is literally the last line of microbial defense for each winery. It is critical that this part of the winemaking process be the cleanest and the most sanitary area possible, and that it has the most comprehensive and robust QA/QC program in the winery. ■

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Dr. Robert Tracy, with nine years of scientific research experience and seven years of winery laboratory and quality control/quality assurance experience, specializes in wine chemistry and microbiology, winery sanitation, and QA/QC. He is co-founder of BevTrac Mobile Quality Systems LLC, based in Windsor, CA (www.bevtracquality.com), providing a mobile wine laboratory and consulting services to the wine industry. Please direct inquiries to robert.tracy@bevtracquality.com or tel: 707/239-8581.

PERSONNEL POINT OF VIEW *by Carolyn Silvestri*

Is this economy managing your business?

"We're waiting for the results of the "bailout."

"We're waiting for the banks to loosen their lending practices."

"We are waiting to see when things will turn around."

These are typical refrains heard among business owners, including those in the wine industry, in response to the current economy. Our economy and our lives seem to be bombarded by the results of a major economic downturn, the financial crisis, a stock market that rises and falls daily, our continued military involvement, and questions about whether the election will change anything soon.

Running a business in today's economic environment is analogous to being lost in a blizzard: We are uncertain about where we are, when conditions will improve, and whether the rescue plans will really work in time or at all.

With neither a theoretical model nor historical experience to rely on, many businesses are resorting to a passive, "wait and see" approach. This may not be the best idea.

The good news for the wine industry is that the effects don't seem to be nearly as harsh as for other industries. Still, the word is that consumers are buying less and are not likely to purchase as much as they have previously. Wine storage facilities are reporting that their shipments are down.

The domino effect is taking place, and all industries are feeling results of the current economy. More important than the current situation is the fear of the unknown — the immediate and longer-term future of the economy.

No one seems to know whether we have "hit bottom," are "nearing bottom," or the worst is yet to come, but most seem to feel that the best approach is to assume the worst and plan for it. For many this means doing nothing — holding tight and waiting it out. Unfortunately, this strategy can cost a business dearly.

Prudent businesses should operate with caution and work to minimize the financial impact on their operations. Take advantage of this period of economic slowdown to make plans and take steps to ensure your winery continues in the course you have worked hard to set.

Work to ensure your business is in the best possible position to capture sales as we come out of our current economic situation. Use this time for re-evaluating many things critical to the future success of your wine business.

Essential strategies

Rather than merely waiting for the storm to pass, develop a sound strategy for navigating through these challenging times and prepare for future growth. Your plan must address your products/wines, operations, people, and your "worst case" or crisis management.

1. Create a business strategy or re-think your current strategy — Now is the time to re-evaluate your business and its components. A good starting point is your revenue sources.

Look at the wines and products you sell, and evaluate the market demand for each one. Identify those products that are your mainstay and/or still essential to your customers or are necessary to your target markets.

You know your market better than anyone, and although price may be a key factor in many industries, it may not be the first consideration when it comes to your unique customers. Consider whether you can reposition or repackage some of your products to make them necessary or more appealing during this time.

2. Examine your sales and marketing tactics — Determine whether your usual marketing approach is effective or appropriate during this period. The wine industry has been doing this for several years.

The Direct to Consumer focus has definitely helped, and a focus and expansion in this area will continue to positively affect the bottom line. Consider whether special price adjustments might stimulate sales on some wines. Consciously evaluate whether a new or radical marketing strategy may produce better results in this economy.

3. Assess your organization in light of your marketing strategy — Determine what services and skills are essential to your operation right now, but also consider what services and skills will be essential to your business when the economy turns around and you want to ramp up. If, in the interest of short-term cost cutting, you eliminate something critical to your long-term viability that cannot be replaced easily, you run the risk of crippling future growth and reputation.

4. Create an HR survival plan — Your human resources (HR) survival plan should focus on identifying what tasks are critical to your operation in the near-term and the long run, reorganizing your staff to perform those tasks with a minimum of people, and effectively managing and motivating those critical employees.

Identify what skills your company must have to operate and then determine which of your employees have those skills, without regard to their current duties. You achieve the highest level of efficiency by reassigning job duties to those employees who have critical skills and laying off those who are not essential. You must be sensitive to your long-term needs, however, and not lose employees who are vital to the company's long-term health.

You need a well-conceived and well-executed downsizing plan to maximize the benefits of your restructuring while minimizing your legal exposure.Your HR department or outside HR or legal counselor should be involved in the development, implementation, and communication of your downsizing plan.

The remaining employees will have issues that you need to address. Though they may feel some measure of relief about surviving a lay-off, they may feel guilt. They also may be concerned about their future job security and perhaps resentful of or overwhelmed by the burden of additional work.You need plans for addressing morale, skill-building, and compensation issues to ensure that the remaining staff is productive and that you do not lose key employees.

Communicate, communicate again, and continue communicating with your employees. There is no such thing as too much communication during turbulent times. Remember

that employees don't know everything you know about your business. Don't take anything for granted.

Rumors are counterproductive, time consuming, and fuel unnecessary fear. Take the time to include employees in updates and plans for your business. Informed employees are more productive and feel empowered as contributing members of your team.

5. Develop a "critical situation" management plan — A "critical situation" management plan serves two key purposes: First, it is a strategy for responding to a variety of emergencies, thereby minimizing the risk of a panic-driven response. Second, awareness within your company of the existence of such a plan reduces employee fear and anxiety.

The core of a "critical situation" management plan is "expecting the unexpected." In the aftermath of September 11, 2001, and the ensuing anthrax scare, what was once unimaginable became imaginable. Preparation of a plan begins with identifying the events, likely or not, that could damage your business. What if your bank or other critical supplier ceased to exist or was suddenly unable to operate? What if one of your primary vendors shut down without notice?

Certainly, you cannot plan for every conceivable crisis. So, review your "what if" list and make a judgment call as to which events are most likely to occur and which ones could cause the most damage to your business or employees based on your unique circumstances.

Involve your employees in developing your "critical situation" management plan. Identify the highest risk areas, that could affect your operations and come up with a possible plan in response. The key to preventing panic and minimizing risk is training your staff on the appropriate alternative plans.

If your employees know there is a plan in the event of a major downturn or event further crippling our economy, they will feel more confident that the company has considered these situations and has a strategy to reduce the severity of the effects. Employees involved in creating a plan will have a heightened level of confidence and will be much less likely to feel panic due to the unknown.

6. Focus on remaining optimistic — Our economy has seen recessions and economic downturns in the past. The good news is that each time we have also had an economic recovery. Undoubtedly, the times call for a conservative approach to managing your wine business. However, you still need to be proactive rather than merely "waiting it out." You can manage your business through the economic crisis, or you can let the crisis manage your business. It's up to you. ■

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Lodi International Wine Awards

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who tend to favor dry, high-intensity, assertive wines; "sensitive tasters," the median group with a rather broad range of preferences; and "hyper-sensitive tasters," who usually have an aversion to bitterness and favor delicacy over intensity. They often prefer some degree of sweetness in their wines.

At the 2008 LIWA, judges sat at individual tables with their own glasses and were not allowed to take tasting notes or write anything down. Instead, each ranked his or her favorite wine in order of preference.

What the data shows

Dr. Virginia Utermohlen-Lovelace, an associate professor at Cornell University with an interest in how people differ in their preferences for food and wine, tested Hanni's assumptions. She took the scoring information and drew several conclusions on what people can actually taste and smell in a wine.

"Hyper-sensitive" judges either strongly liked a wine (according to the data), awarding more Gold medals than any other group, or strongly disliked it and were more likely to detect flaws.

"Sensitive judges" were more likely to give no medals, while those with "tolerant" taste buds were somewhat more likely to give Silvers, according to Utermohlen-Lovelace This led her to believe perhaps they enjoyed the wines, but were less likely to find ones that matched their all-time best remembered wine, that likely would have received a Gold. Instead, they took the middle-of-the-road approach.

"Hyper-sensitive" people, not surprisingly, are much more sensitive to off-flavors, but they are more enthusiastic about the wines they do like. Despite being unable to detect flaws as efficiently as the "hyper-sensitive," "sensitive" people seem to be more selective in what they like.

Conclusion

"This was the first time we have executed a judging in this manner," reports Hanni. "Overall, we are very pleased with the results and what we have learned. The vast number of assumptions we made were validated by the LIWA statistics; some very interesting results will give us plenty of fodder for next year." ■

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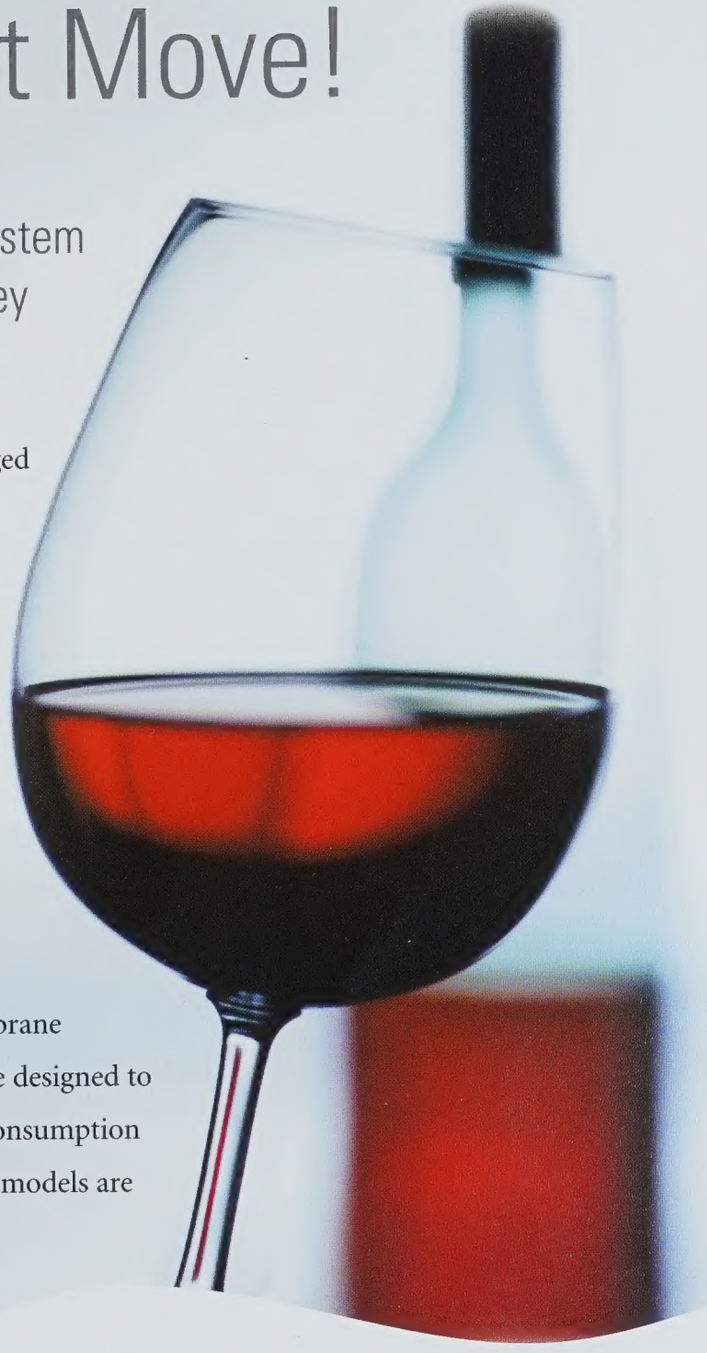

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